

# Air Quality Monitoring Network

Namoi/North West Slopes Region – Autumn 2023



Air quality in the Namoi/North West Slopes region was good during autumn 2023 and all stations met national benchmarks<sup>1</sup> on 98% of days (Figure 1). Good air quality across the region were sustained by the prevailing climate conditions. It was cooler and drier than average for all autumn months with greater than 95% ground cover, reducing dust activity.

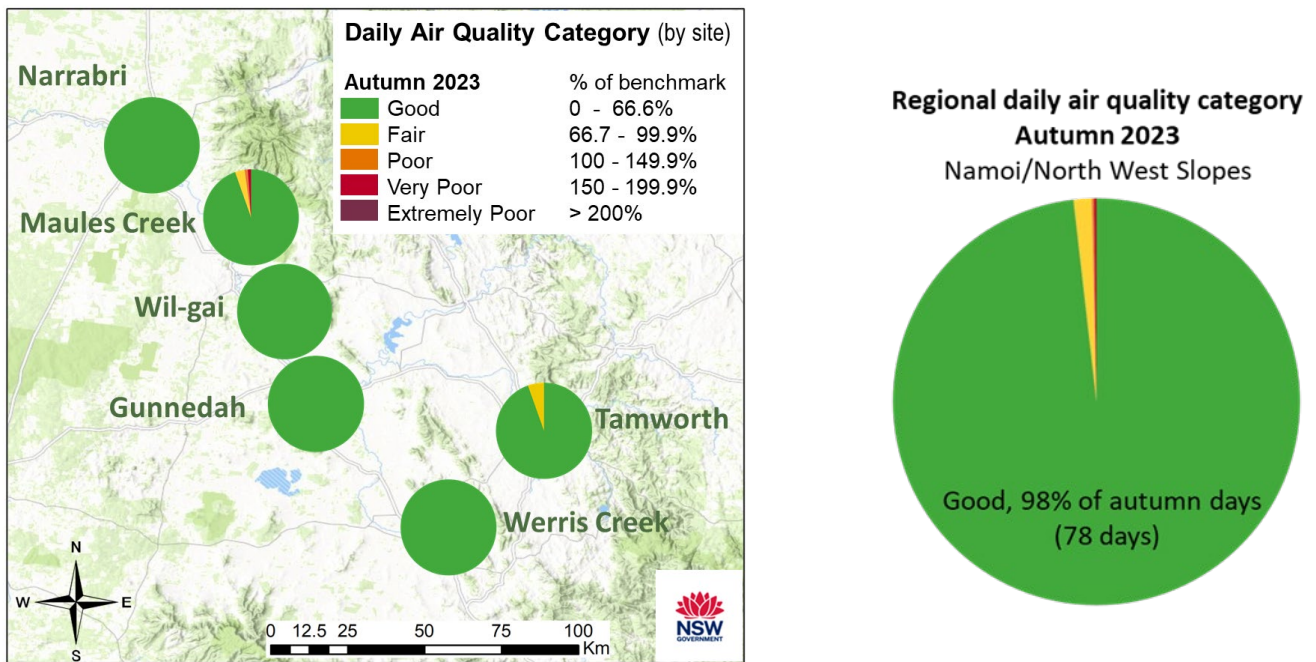


Figure 1 Daily air quality categories at individual monitoring stations (left) and regional air quality in the Namoi/North West Slopes region (right).

## Air quality: summary statistics, autumn 2023

There was 2 days above the national benchmarks for PM<sub>2.5</sub> recorded at Maules Creek during autumn 2023 (Table 1).

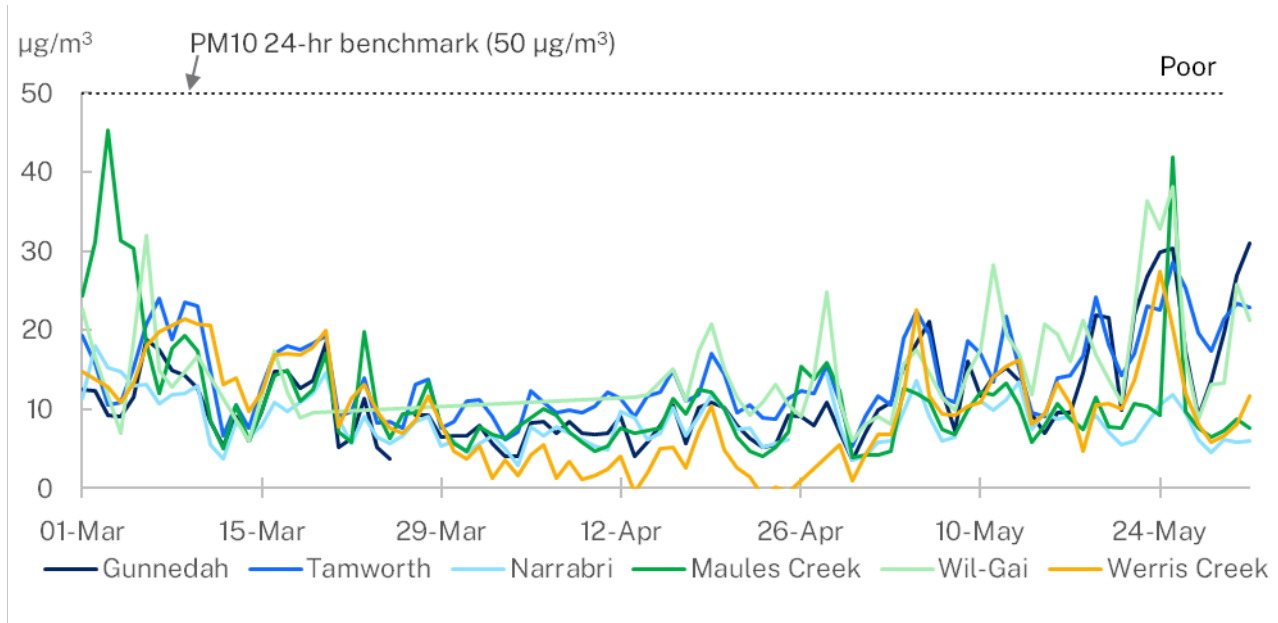
Table 1 Number of days above each benchmark, by station, 1 March 2023 to 31 May 2023

Station	PM <sub>10</sub> daily benchmark [50 µg/m <sup>3</sup> ]	PM <sub>2.5</sub> daily benchmark [25 µg/m <sup>3</sup> ]	NO <sub>2</sub> hourly benchmark <sup>1a</sup> [8 pphm]	O <sub>3</sub> 8-hourly benchmark <sup>1a</sup> [6.5 pphm]
Gunnedah	0	0	0	0
Narrabri	0	0	-	-
Tamworth	0	0	0	0
Maules Creek	0	2	-	-
Werris Creek	0	0	-	-
Wil-gai	0	0	-	-

- = not monitored; µg/m<sup>3</sup> = micrograms per cubic metre; pphm = parts per hundred million by volume (i.e., parts of pollutant per hundred million parts of air).

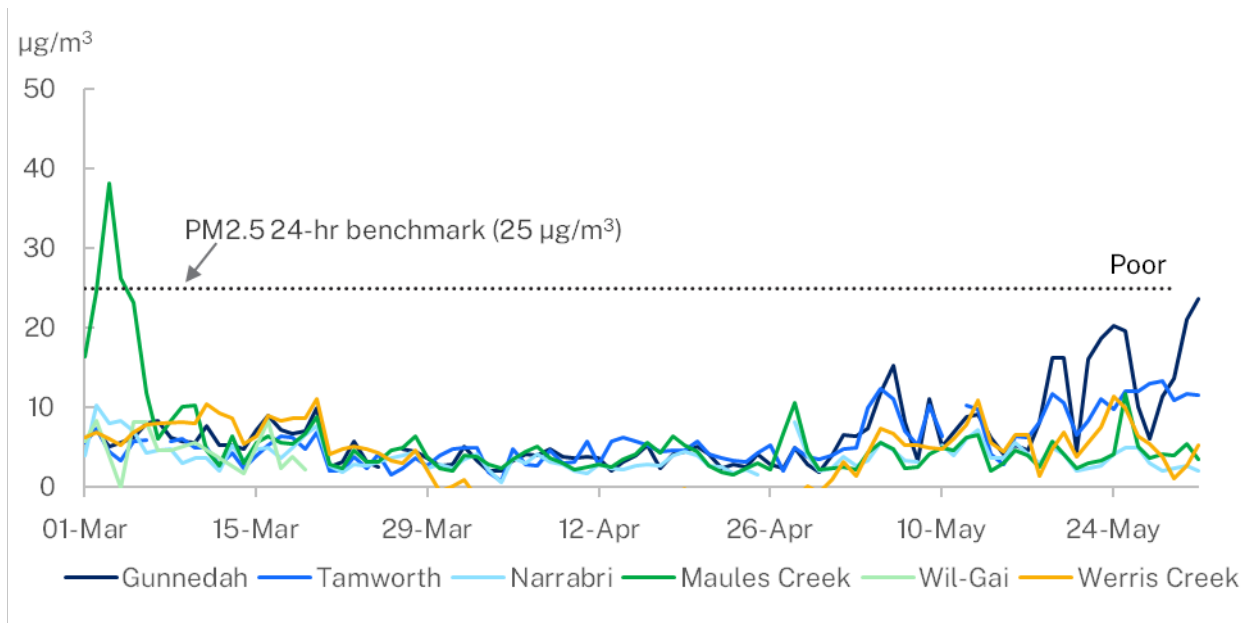
## Air quality: particle pollution autumn 2023

Daily average PM10 levels were below the benchmark at all sites (Figure 2).



**Figure 2** Daily average PM10 in autumn 2023, showing concentrations below the benchmark.

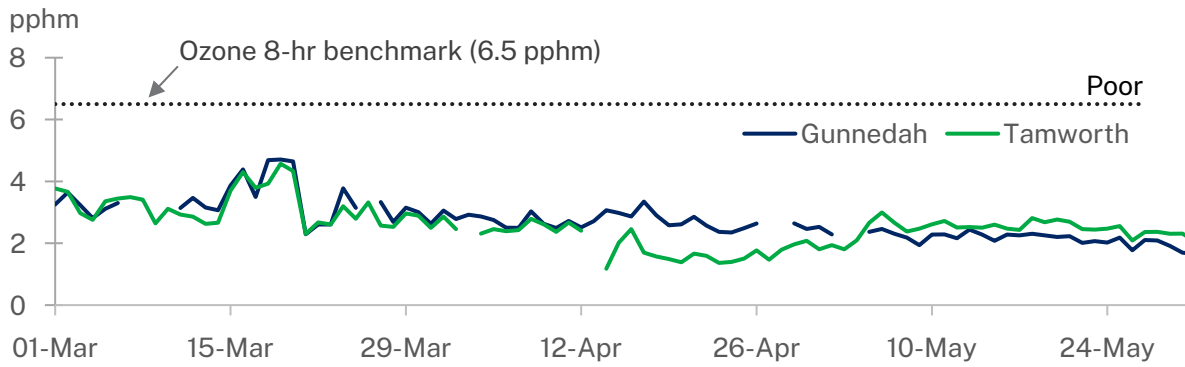
Daily average PM2.5 levels were below the benchmark, except at Maules Creek, which recorded PM2.5 concentrations above the benchmark on 2 days in March 2023 (Figure 3).



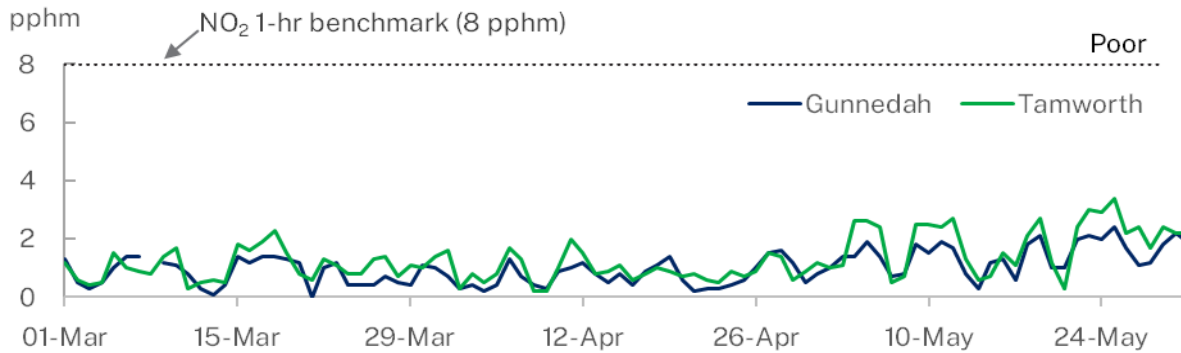
**Figure 3** Daily average PM2.5 in autumn 2023, showing concentrations below the benchmark.

## Air quality: gaseous pollution autumn 2023

Figure 4 and Figure 5 show autumn 2023 trends at Gunnedah and Tamworth stations were characterised by broadly stable ozone and nitrogen dioxide concentrations, well below the O<sub>3</sub> and NO<sub>2</sub> standards<sup>2</sup>.



**Figure 4** Ozone daily maximum 8-hour average concentrations at Gunnedah and Tamworth, during autumn 2023, showing levels below the benchmark.



**Figure 5** Nitrogen dioxide daily maximum 1-hour average concentrations at Gunnedah and Tamworth, during autumn 2023, showing levels below the benchmark.

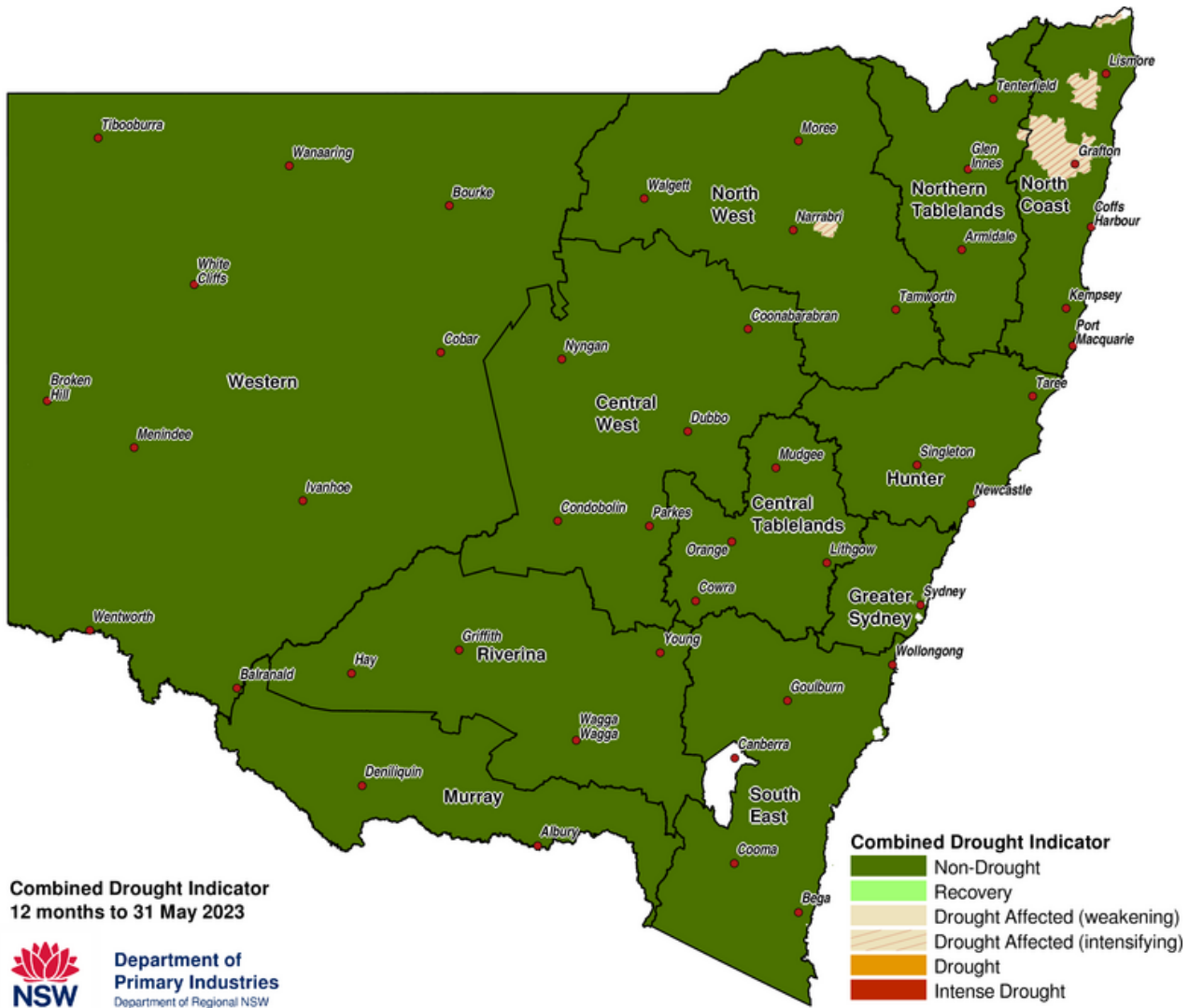
## Seasonal weather and climate

Autumn 2023 was drier than average, especially for April and May in north-west New South Wales. Minimum temperatures were below average for large areas west of the Dividing Range, as well as parts of the Mid North Coast and the Northern Rivers<sup>2</sup>. Rainfall was very much below average for all autumn months in the Northern Tablelands and Northern Rivers. The New South Wales area-averaged rainfall total for autumn 2023 was 102.07 mm, which was 31.6% below the 1961 to 1990 average.

## Drought conditions and dust activity

The NSW DPI Combined Drought Indicator (CDI) shows greater than 99% of New South Wales remains in the non-drought category at the end of May 2023<sup>3</sup> (Figure 6). May rainfall was variable, concentrated largely in the southern, northern-eastern and isolated parts of coastal New South Wales. Dry conditions have impacted parts of the state leading to a rapid decline in plant growth and rainfall indicators in the north, north-east and south-east.

DustWatch<sup>4</sup> reported below long-term average levels of dust activity in the Northwest NSW region during autumn 2023. In addition to very good ground cover and below-average rainfall, wind strength was also below long-term average for autumn.

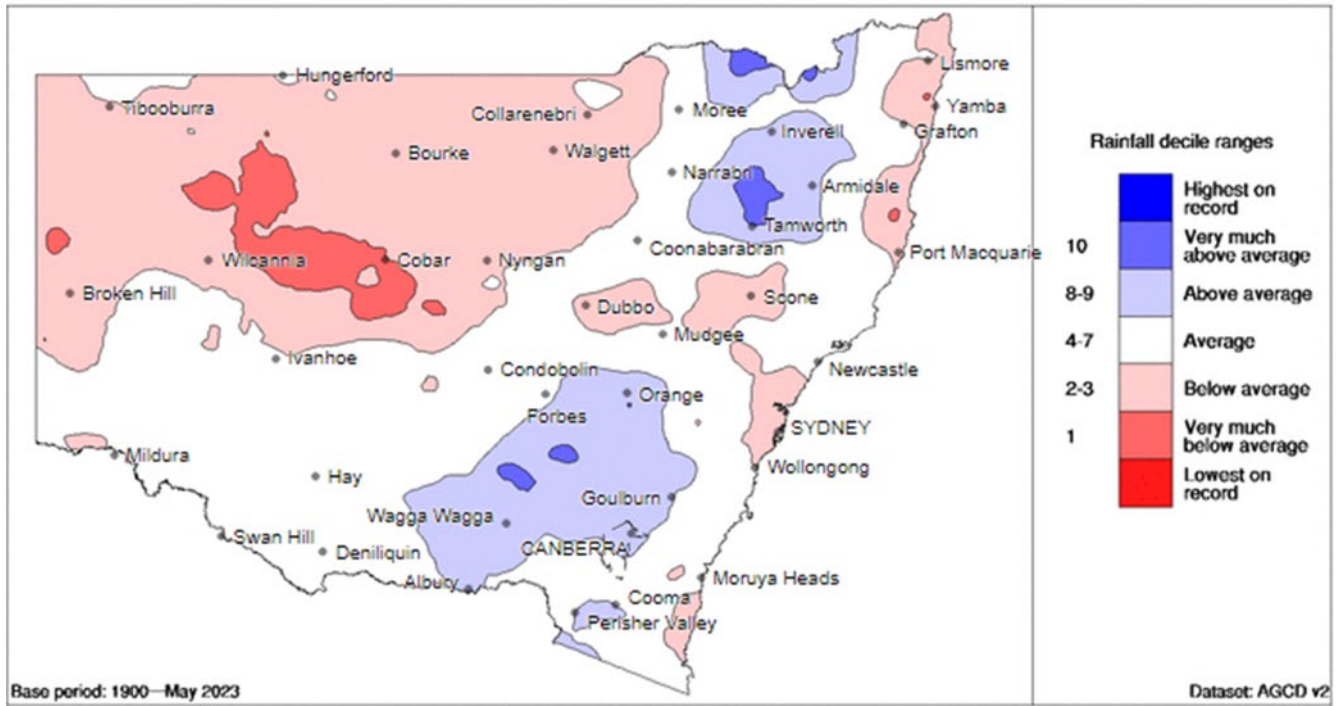


**Figure 6 NSW Combined Drought Indicator – 12 months to 31 May 2023, showing non-drought conditions across the Namoi/North West region and generally across the state.**

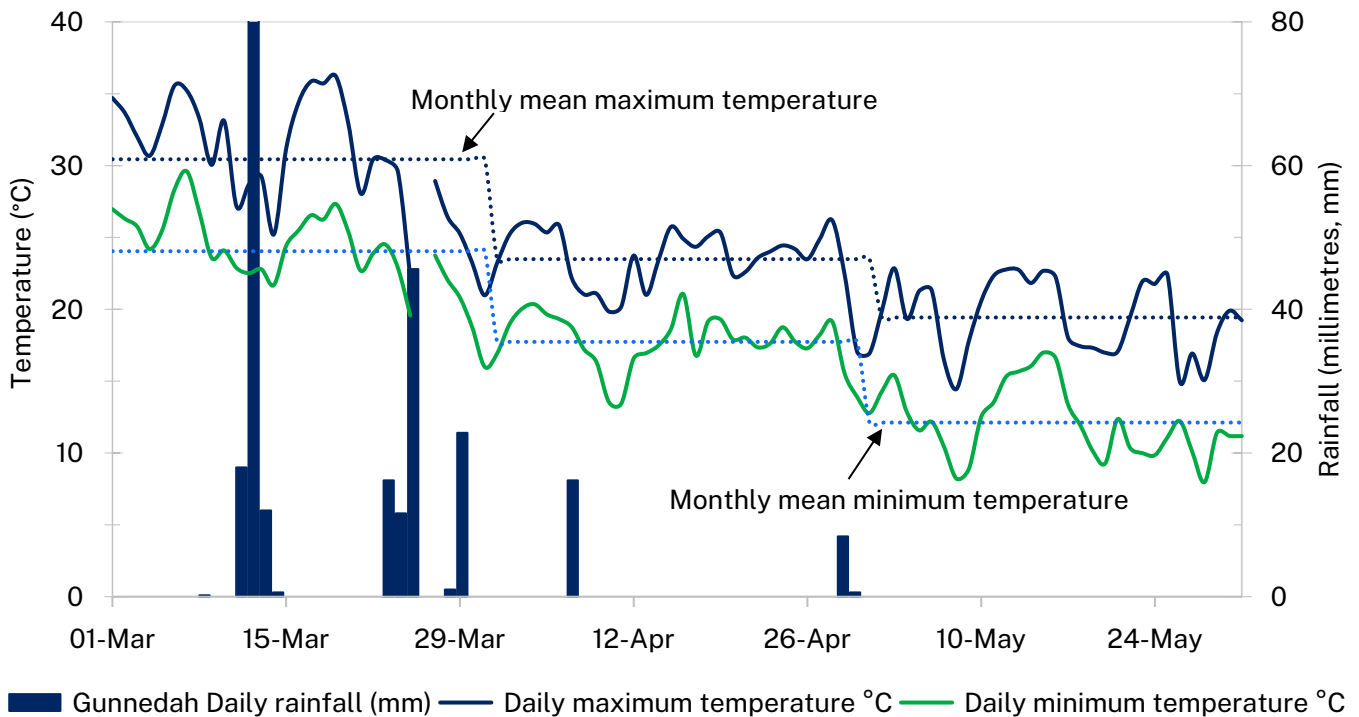
## Rainfall

The Bureau of Meteorology’s (BoM) seasonal rainfall summary at Figure 7<sup>5</sup> shows that rainfall during autumn 2023 was average to very much above average for most of the Namoi/North West Slopes region. Rainfall totals across the region ranged between 200–300 millimetres (mm)<sup>6</sup>, lower compared to autumn totals for the region in the past 3 years (2020, 2021, 2022).

Seasonal rainfall totals for autumn 2023 at Tamworth AWS (245mm)<sup>7</sup> and Gunnedah AWS (227 mm)<sup>8</sup> BoM stations were much higher than their respective long-term autumn totals (117 mm and 108 mm)<sup>11,12</sup>. The department’s Gunnedah air quality monitoring station (Gunnedah AQM) recorded 234 mm of rainfall (Figure 8)<sup>9</sup>, well above the Gunnedah AWS long-term total for autumn (108 mm).



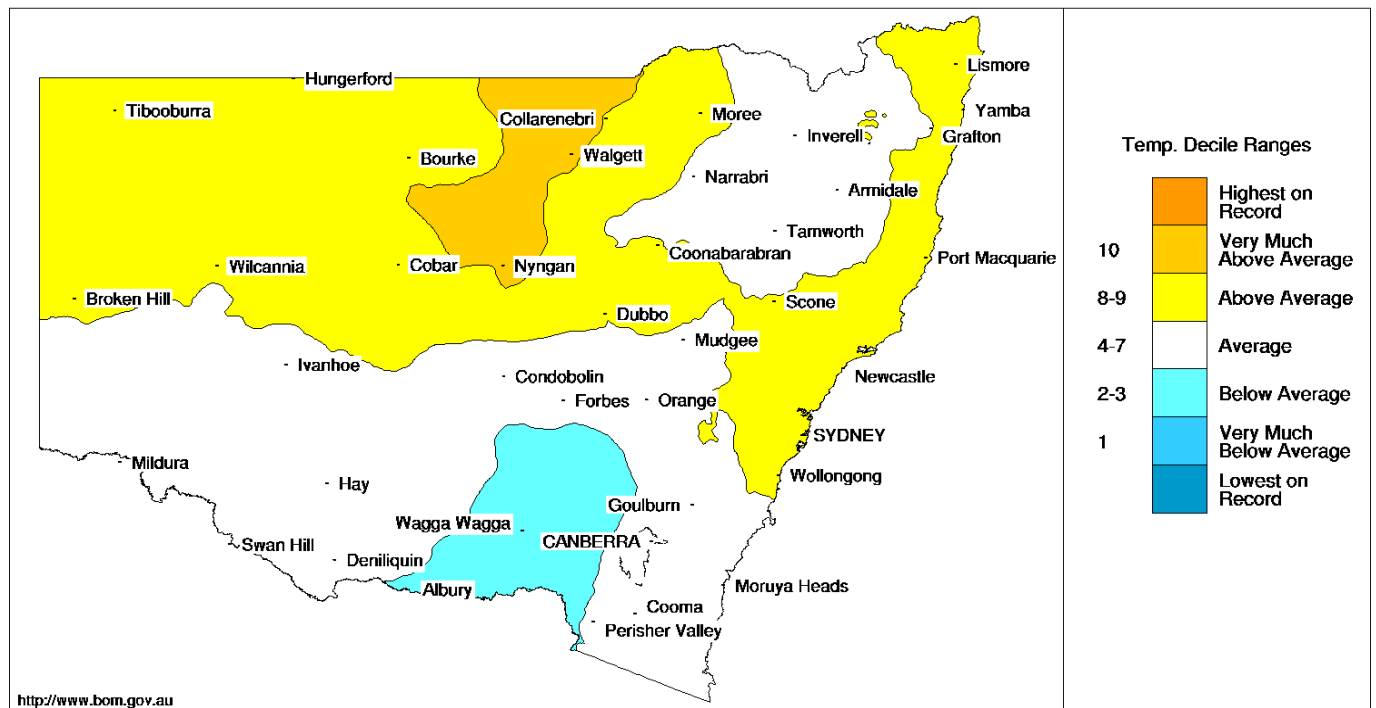
**Figure 7** NSW rainfall deciles for autumn, 1 March to 31 May 2023, showing average to below average rainfall in the Namoi/North West Slopes region (Commonwealth of Australia 2023, Bureau of Meteorology).



**Figure 8** Gunnedah AQM station meteorology conditions, showing rainfall days and seasonal maximum and minimum temperatures during autumn, 1 March to 31 May 2023.

## Temperature

Maximum daytime temperatures across the Namoi/North West Slopes region were average according to the Bureau's autumn 2023 seasonal summary (Figure 9)<sup>10</sup>.



**Figure 9 NSW maximum temperature deciles, showing average maximum temperatures in the North West Slopes region during autumn, 1 March to 31 May 2023 (Commonwealth of Australia 2023, Bureau of Meteorology).**

The department's Gunnedah AQM station recorded cooler-than-average days (maximum temperatures) compared to the long-term autumn maximum at Gunnedah AWS. Autumn maximum temperatures at Gunnedah AQM station ranged from 14.4 to 36.2°C (orange line at Figure 8), with an average of 24.4°C, about 2°C lower compared to the long-term autumn maximum at Gunnedah AWS (26.1°C)<sup>13</sup>.

Overnight (minimum) temperatures at Gunnedah AQM station were slightly above average. Minimum temperatures ranged from 8.0 to 29.6°C (blue line at Figure 8) with an average of 17.9°C, about 7.4°C higher than the Gunnedah AWS<sup>13</sup> long-term average autumn minimum (10.5°C). The Bureau's autumn 2023 seasonal summary<sup>11</sup> shows average minimum temperatures in the region.

## Wind

The topography of the North West Slopes region is characterised by highlands in the east and south, and to the west lies a broad floodplain, with Namoi River flowing north-west through Gunnedah and Narrabri, and Peel River flowing north-west through Tamworth. Prevailing winds across the region generally align with the direction of the Namoi and Peel River valleys, that is, along the south-east to north-west sector.

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 autumn months, prevailing winds in autumn 2023 were generally light to moderate south-easterlies. However, some influence from other sectors was observed from all 3 stations.

Gunnedah AQM station<sup>12</sup> is located within the region’s population centre, as is Tamworth AQM station<sup>13</sup> and both stations are surrounded by high population densities. Narrabri AQM station<sup>14</sup> is located at Narrabri Airport, outside of the regional population centre which is located to the west.

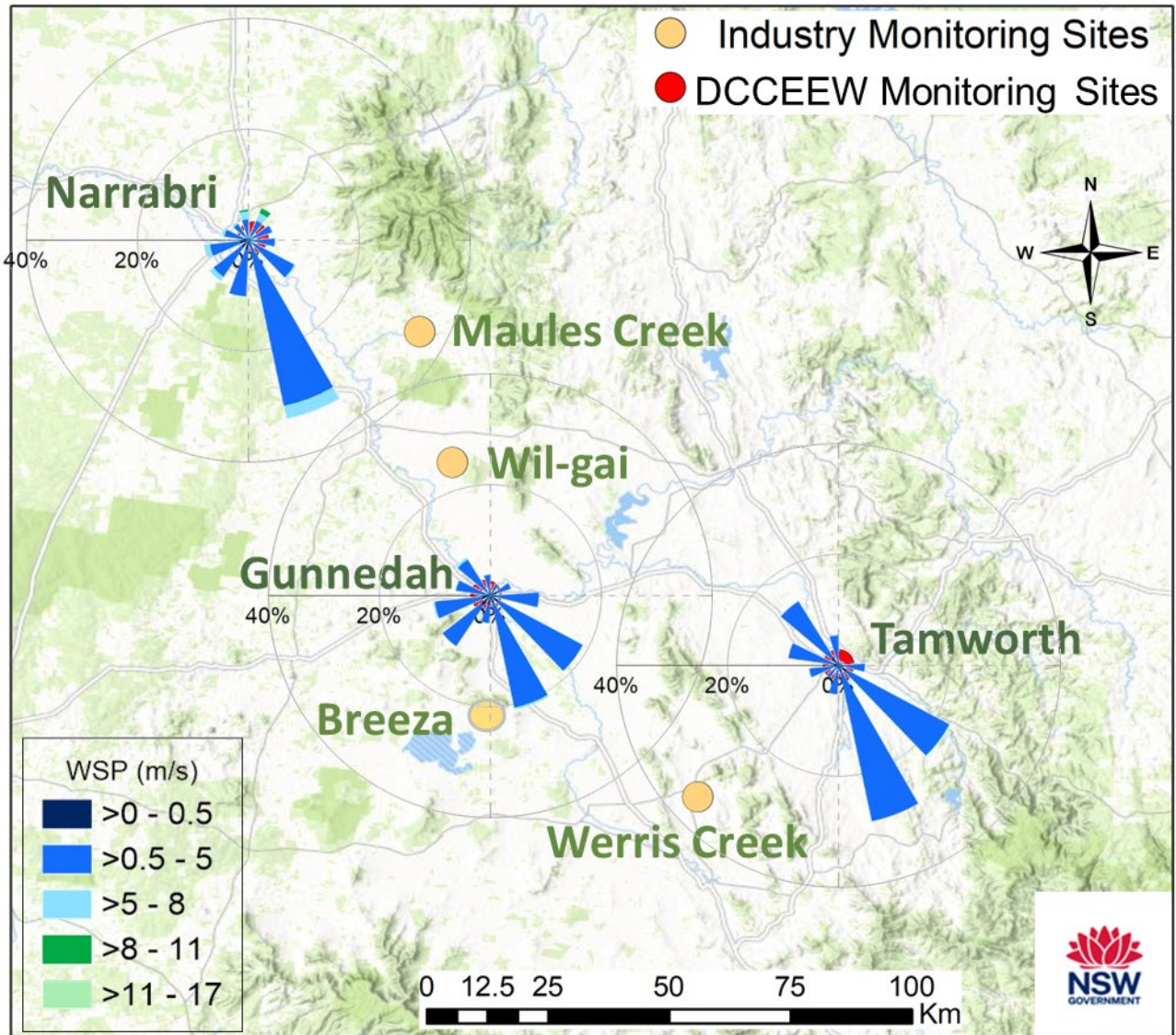
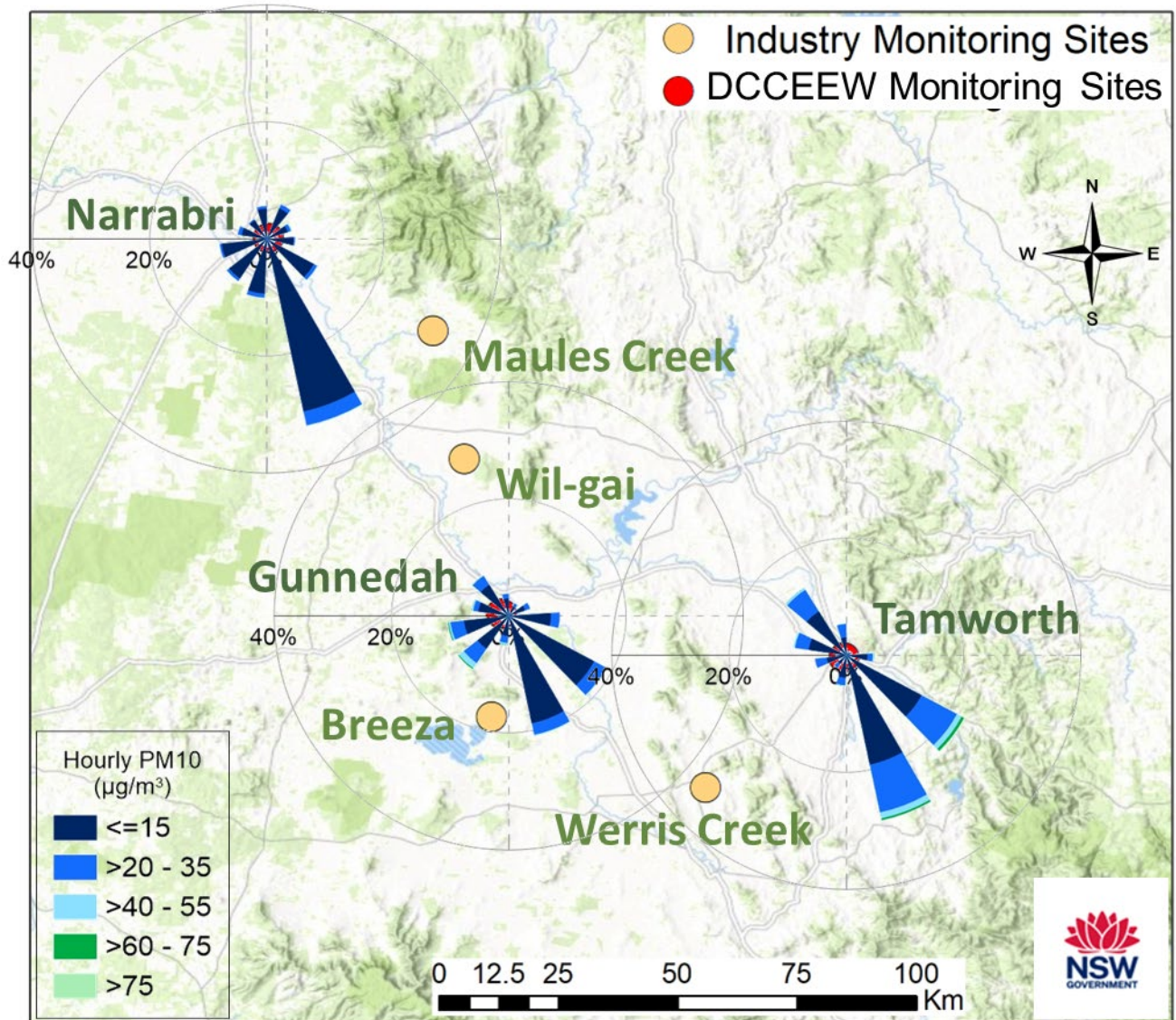


Figure 9 Wind rose map for the Namoi/North West Slopes during autumn 2023.

## Pollution roses from hourly particle data

Pollution roses show the wind direction and particle levels at a location, with the length of each bar around the circle showing the percentage of time wind blows from each direction. The colours along the bars indicate the concentration of particle levels. Figure 11 shows autumn 2023 pollution roses for the 3 regional centres (Narrabri, Gunnedah and Tamworth).

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 also associated with north-westerlies at Gunnedah and Tamworth. However, at Narrabri, lower particle levels were associated with north-easterlies.





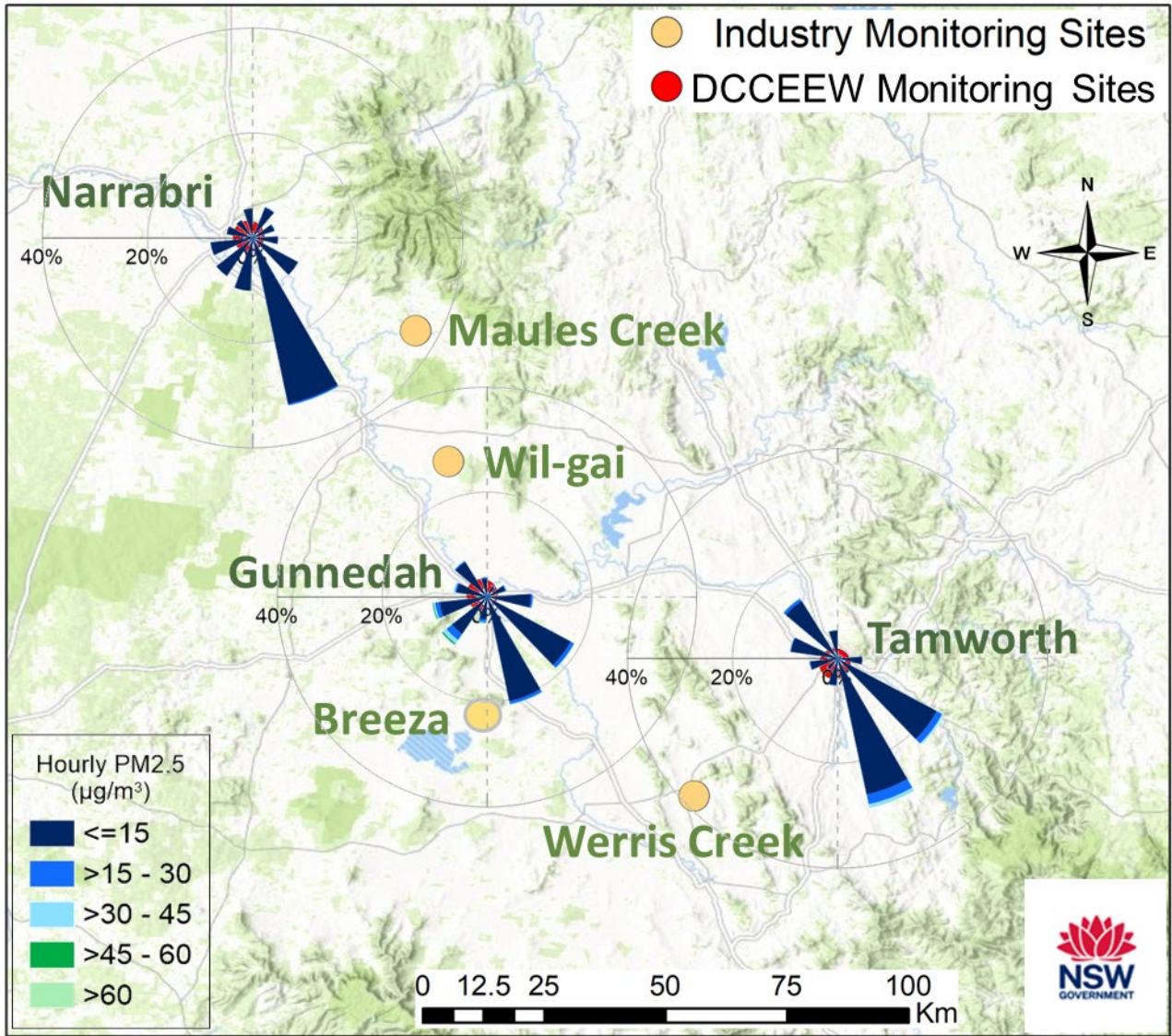


Figure 10 Pollution roses for hourly PM10 (top) and PM2.5 (bottom) in autumn 2023.

## Online performance of monitoring stations

The target performance for air quality monitoring at the 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, NO<sub>2</sub> and O<sub>3</sub>, is 95% due to daily calibrations.

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

- All stations met online targets for monitoring of meteorology.
- Gunnedah, Narrabri and Tamworth met online targets for monitoring of PM10 and PM2.5.
- Online targets were not met at Gunnedah for NO<sub>2</sub> and O<sub>3</sub> due to scheduled instrument maintenance.

**Table 2 Online performance (%) from 1 March to 31 May 2023**

Station	Particles PM10 daily	Particles PM2.5 daily	Gases NO <sub>2</sub> hourly	Gases O <sub>3</sub> hourly	Meteorology wind hourly
Gunnedah	98.9	98.9	93.2	91.5	99.6
Narrabri	96.7	96.7	-	-	99.9
Tamworth	100	97.8	95.1	95.2	100

'-' not monitored.

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- <sup>1, 1a</sup> [The National Environment Protection \(Ambient Air Quality\) Measure \(Air NEPM\)](#) sets national standards for common urban air pollutants, which in this report are referred to as air quality 'benchmarks'. 1a: the 2021 amended NEPM strengthened the 1-hour NO<sub>2</sub> standard (from 12 pphm) and replaced the previous O<sub>3</sub> standards with the 8-hour rolling average standard.
- <sup>2</sup> Air quality categories based on the updated national gaseous standards (or benchmarks) are not yet established. Hence these plots do not show any other air quality category other than 'poor' which are defined by benchmarks.
- <sup>2</sup> [Seasonal Climate Summary for New South Wales in Autumn 2023](#), Bureau of Meteorology, accessed August 2023.
- <sup>3</sup> Combined Drought indicator for [12 months to 31 May 2023](#), Department of Primary Industries, accessed August 2023.
- <sup>4</sup> [DustWatch Reports: March 2023, April 2023 and May 2023](#), Department of Planning and Environment, accessed August 2023.
- <sup>5</sup> Rainfall decile map for [3 months to 31 May 2023](#) for NSW, Bureau of Meteorology, accessed August 2023.
- <sup>6</sup> [Autumn 2023 rainfall totals and 1-year to 3-year differences](#), Bureau of Meteorology, accessed August 2023.
- <sup>7</sup> [Daily Weather Observations - Tamworth Airport Automatic Weather Station \(AWS\)](#), accessed August 2023.
- <sup>8</sup> [Daily Weather Observations - Gunnedah Airport Automatic Weather Station \(AWS\)](#), accessed August 2023.
- <sup>11</sup> [Summary climate statistics - Gunnedah Airport AWS](#), Bureau of Meteorology, accessed August 2023.
- <sup>12</sup> [Summary climate statistics - Tamworth Airport AWS](#), Bureau of Meteorology, accessed August 2023.
- <sup>9</sup> DPE observations at Gunnedah air quality monitoring (AQM) station. These data are not NATA accredited.
- <sup>10</sup> [Temperature \(maximum\) decile map for 3 months to 31 May 2023](#), Bureau of Meteorology, accessed August 2023.
- <sup>11</sup> [Temperature \(minimum\) decile map for three months to 31 May 2023](#), Bureau of Meteorology, accessed August 2023.
- <sup>12</sup> [About the DPE Gunnedah Air Quality Monitoring station.](#)
- <sup>13</sup> [About the DPE Tamworth Air Quality Monitoring station.](#)
- <sup>14</sup> [About the DPE Narrabri Air Quality Monitoring station.](#)