Air quality in the Namoi/North West Slopes Region

Autumn air quality in 2021 in the Namoi/North West Slopes was good[1], meeting national benchmarks[2] on 100% of days. All seven monitoring stations[3] recorded their lowest air pollution levels since reporting began in 2018. Maximum concentrations were below two-thirds of the national benchmarks (Figure 1). Autumn 2021 in New South Wales was the wettest since 2000 and the coolest since 2012.

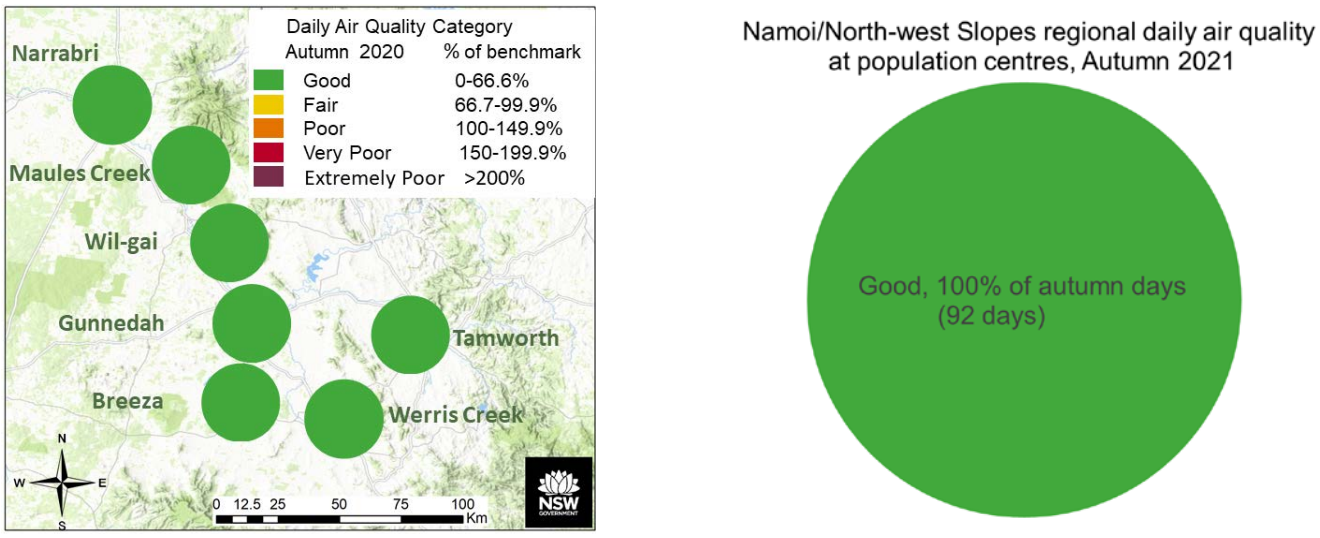

Figure 1 **Daily air quality categories at monitoring stations (left) and regional air quality (right)**

Air quality summary statistics, autumn 2021

No days above the national benchmarks were recorded at any stations during autumn 2021 (Table 1).

Table 1 **Air quality summary statistics, days above benchmarks by station, 1 March to 31 May 2021**

Station	PM10 daily benchmark [50 µg/m^3]	PM2.5 daily benchmark [25 µg/m^3]	NO_2 hourly benchmark [12 pphm]	O_3 hourly benchmark [10 pphm]	O_3 4-hourly benchmark [8 pphm]
Narrabri	0	0	-	-	-
Gunnedah	0	0	0	0	0
Tamworth	0	0	-	0	0
Maules Creek	0	0	-	-	-
Wil-gai	0	0	-	-	-
Breeza[4]	0	0	-	-	-
Werris Creek	0	0	-	-	-

- = not monitored, hr=hour, µg/m^3 = micrograms per cubic metre, pphm = parts per hundred million by volume (i.e. parts of pollutant per hundred million parts of air).

[1] This newsletter uses revised NSW air quality categories to compare air pollutants to national benchmarks. The 'Good' category combines the former 'Very Good' and 'Good' categories. 'Extremely Poor' replaces the 'Hazardous' category.

[2] The National Environment Protection (Ambient Air Quality) Measure (Air NEPM) sets national standards for common urban air pollutants. This report refers to the national standards as 'benchmarks' for reporting air quality.

[3] Seven air quality monitoring stations operate in the region. The NSW Government operates the monitoring stations at Tamworth (from October 2000), Gunnedah and Narrabri (from December 2017). Data are updated hourly on the NSW air quality website. Industries operate the monitoring stations at Maules Creek, Wil-gai, Breeza and Werris Creek. Industry data are reported weekly on the NSW Environment Protection Authority Namoi air quality monitoring project website. All stations continuously monitor airborne particles with diameters less than 10 and 2.5 micrometres, referred to as PM10 and PM2.5 respectively. The Gunnedah monitoring station also monitors gaseous air pollutants, nitrogen dioxide (NO_2) and ozone (O_3). Temporary ozone monitoring began at Tamworth in November 2020 as part of the NSW regional ozone monitoring campaign.

[4] Industry monitoring at Breeza ceased on 25 April 2021 after Shenhua Watermark Coal withdrew its mining lease application.

Air quality: particle pollution autumn 2021

The time series of daily average particle concentrations shows PM10 levels well below the benchmark. No stations recorded PM10 concentrations above the benchmark during autumn 2021 (Figure 2).

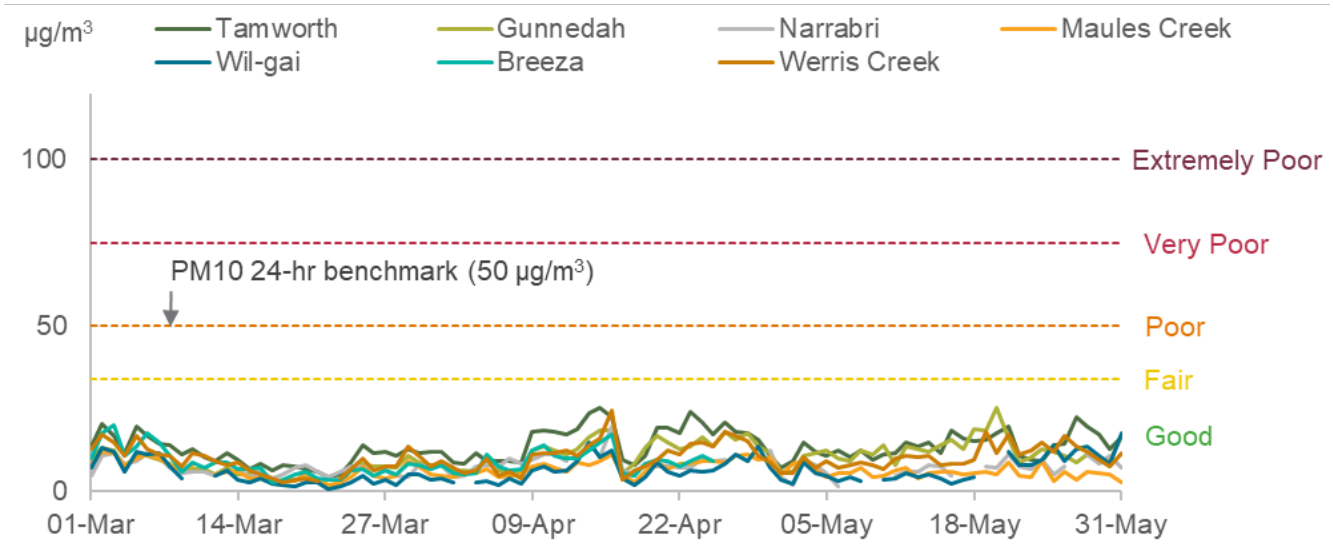

Figure 2 **Daily average PM10 in autumn 2021, showing concentrations below the benchmark**

Daily average PM2.5 levels were below the benchmark. No stations recorded PM2.5 concentrations above the benchmark during autumn 2021 (Figure 3).

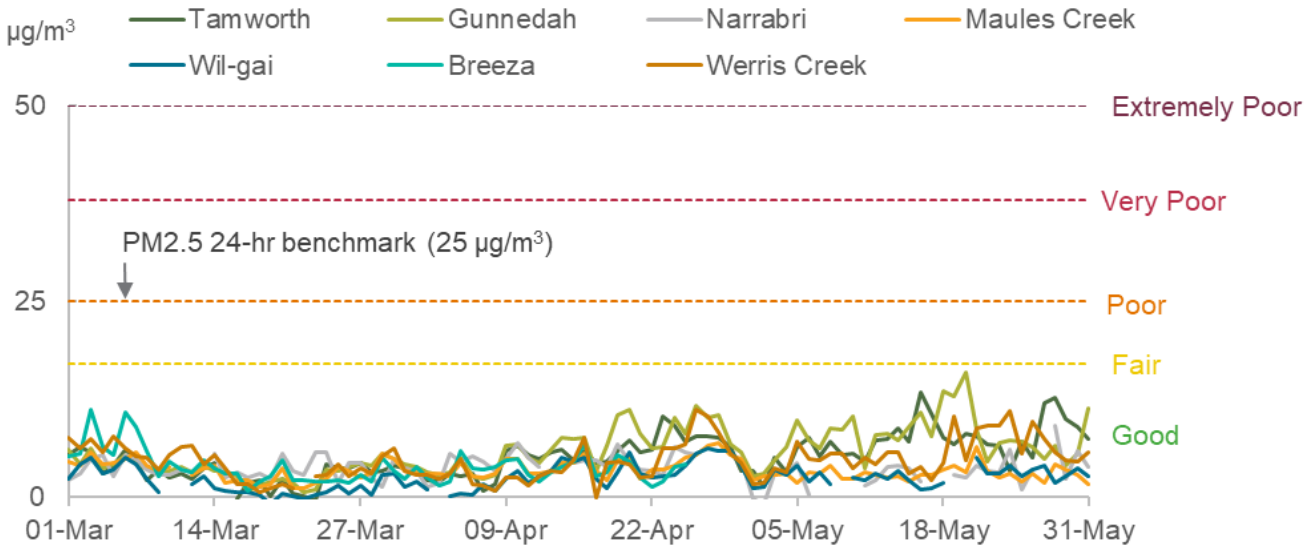

Figure 3 **Daily average PM2.5 in autumn 2021, showing concentrations below the benchmark**

Air quality: gaseous pollution, autumn 2021

Figure 4 to Figure 6 show gaseous pollution concentrations were below relevant standards for O_3 and NO_2 respectively, throughout autumn 2021. Temporary ozone monitoring at Tamworth (as part of the NSW regional ozone monitoring campaign) ceased on 29 April 2021. The similar maximum daily concentrations observed at Gunnedah and Tamworth demonstrated that observed ozone concentrations were likely representative of levels expected throughout the region.

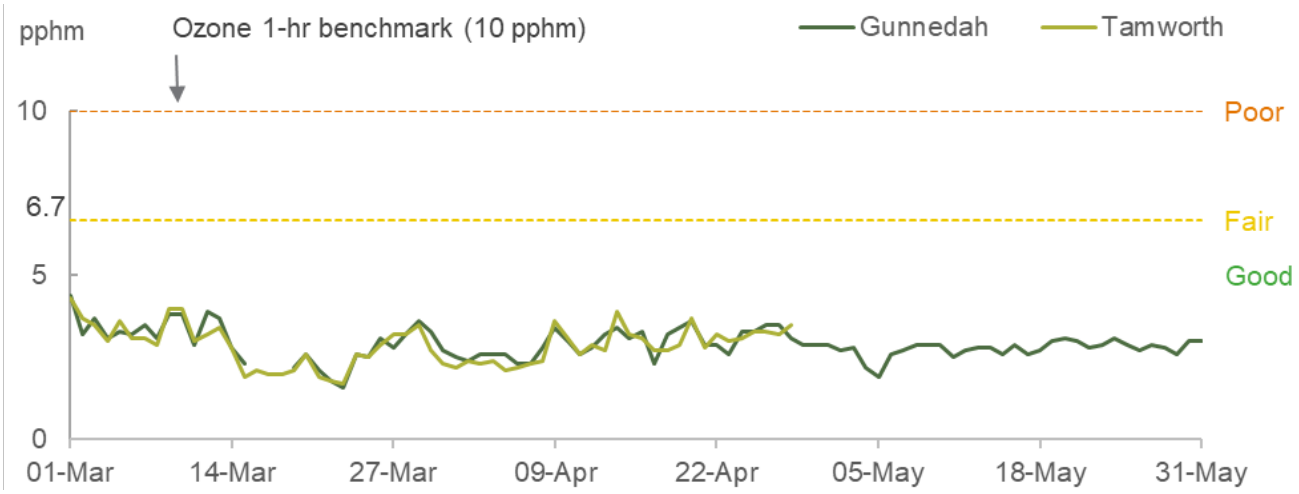

Figure 4 **Ozone daily maximum 1-hour average concentrations at Gunnedah and Tamworth, during autumn 2021, showing levels below the benchmark**

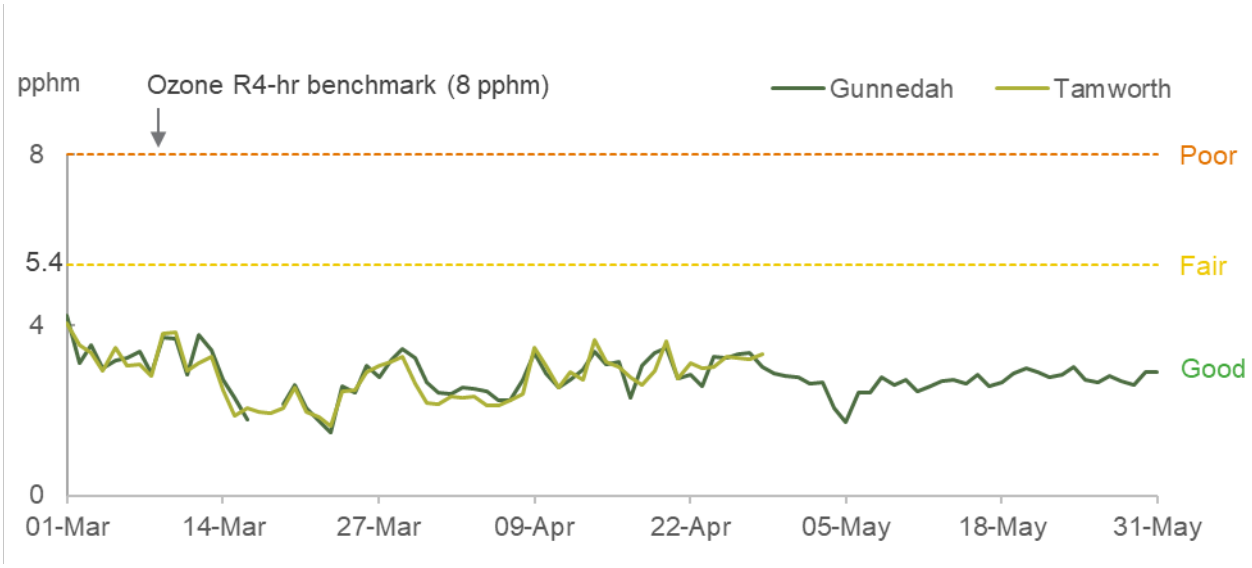

Figure 5 **Ozone daily maximum rolling 4-hour average concentrations at Gunnedah and Tamworth, during autumn 2021, showing levels below the benchmark**

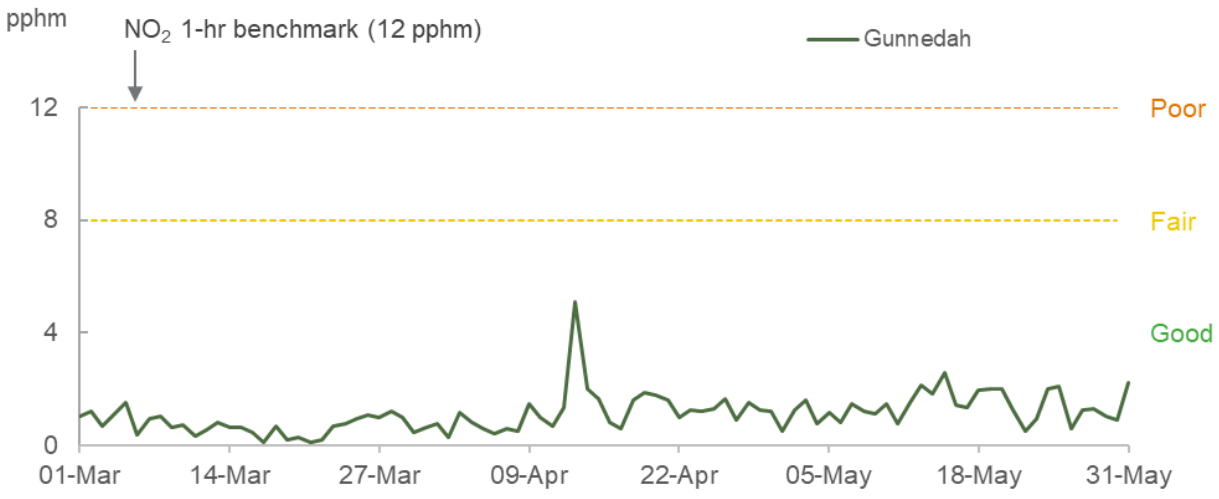

Figure 6 **Nitrogen dioxide daily maximum 1-hour average concentrations at Gunnedah, during autumn 2021, showing levels below the benchmark**

Seasonal weather and climate[5]

Autumn 2021 in New South Wales was the wettest autumn since 2000 and the coolest since 2012. Autumn rainfall was 19% above average. The mean temperature was 0.54°C below the 1961–1990 average. A series of tropical low-pressure troughs brought heavy rainfall across the region. Heavy rainfall over northern inland areas in March brought the State its second-wettest day and third-wettest week on record and the second-wettest March on record[5]. In contrast, slow-moving high-pressure systems brought clear skies and dry conditions for much of April and May, resulting in many relatively cool nights.[5]

Drought conditions and dust activity

Drought recovery weakened during autumn 2021. The NSW Department of Primary Industry reported that the percentage of the State in the Recovery or Non-Drought categories fell from 96% at the end of March 2021 to 84% at the end of May 2021[6] Dry conditions in April and May brought drought expansion across parts of the northern tablelands (Figure 7).

DustWatch[7] reported that very little dust was recorded in the north of the State in autumn 2021, due to heavy rainfall in March and below average wind strengths. Gunnedah recorded zero hours of activity in March and two hours in April. Areas with over 50% groundcover expanded in autumn.

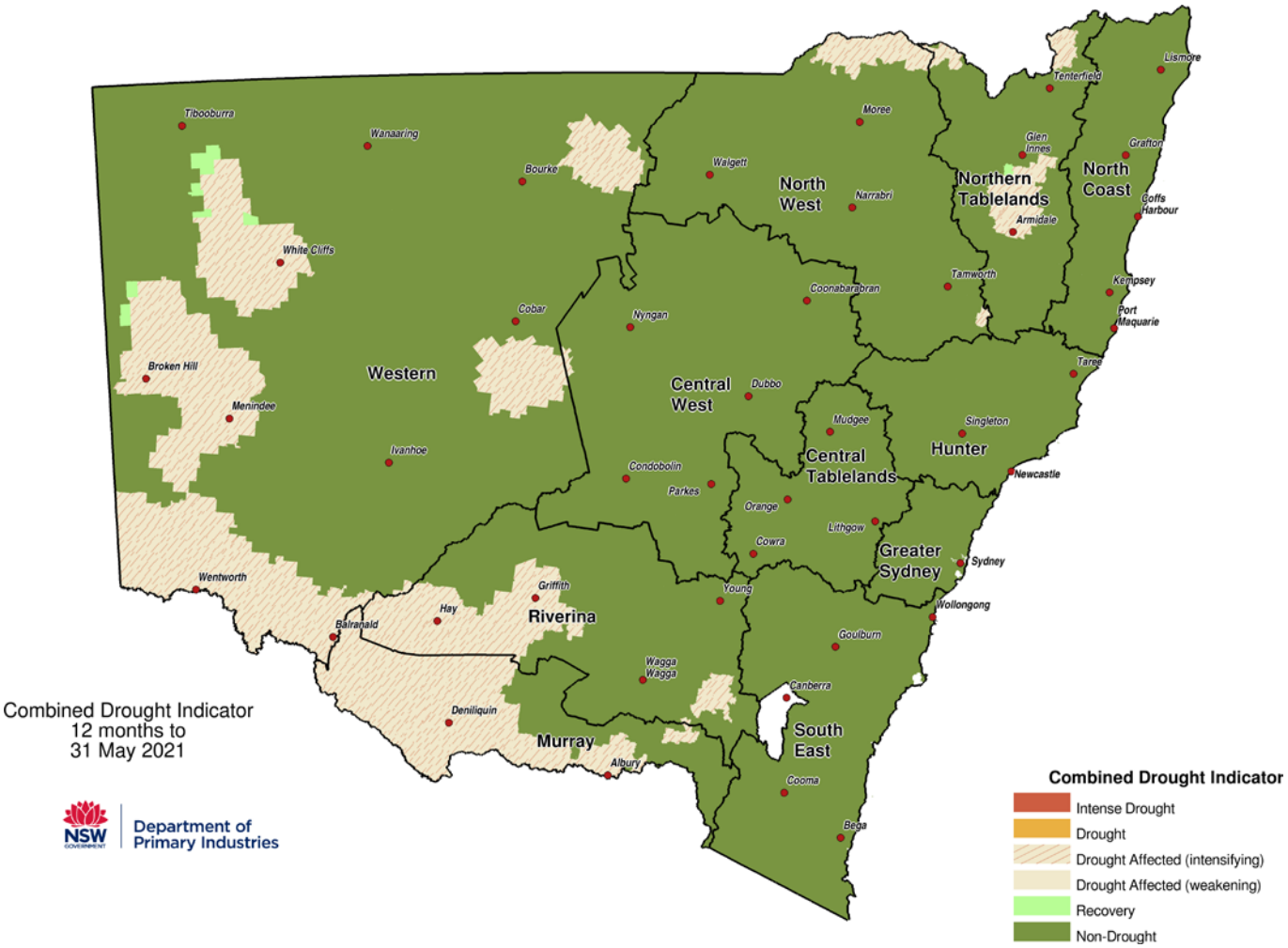

Figure 7 **NSW Combined Drought Indicator – 12 months to 31 May 2021**Error! Bookmark not defined.**, showing non-drought conditions across the Namoi/North West region**

[5] Seasonal Climate Summary for New South Wales–Autumn 2021, Monthly Climate Summary for New South Wales in March, April and May 2021, accessed June 2021

[6] Department of Primary Industries State Seasonal Updates, March, April and May 2021, accessed July 2021.

[7] DustWatch Reports, March, April 2021, accessed July 2021.

Rainfall and temperature

Autumn 2021 rainfall was above average across the region (Figure 8)[8]. Regional rainfall ranged between 100–300 millimetres (mm)[9]. Compared with previous summer seasons, rainfall totals were up to 50 mm higher than autumn 2019–20, 25 to 100 mm higher than autumn 2018–19 and up to 200 mm higher than autumn 2017–18.

Maximum and minimum temperatures were very much below average. Minimum temperatures were up to 2°C below average autumn 2021[10] (Figure 9).

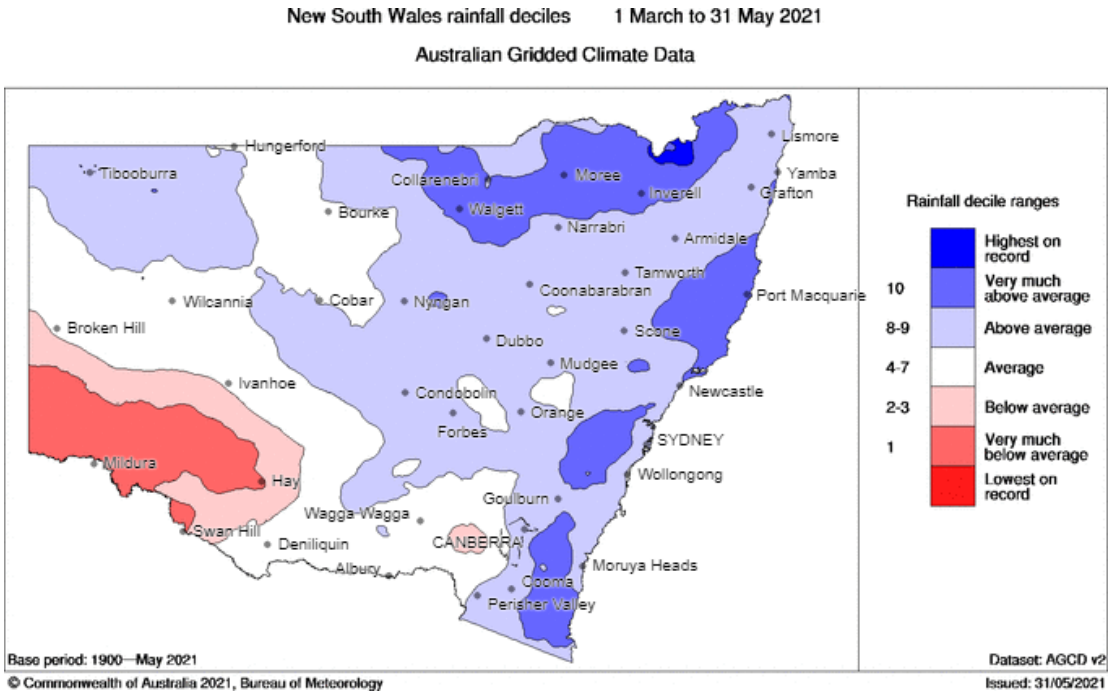

Figure 8 **NSW rainfall deciles for autumn, 1 March to 31 May 2021[8], showing above average rainfall in the Namoi/North West Slopes**

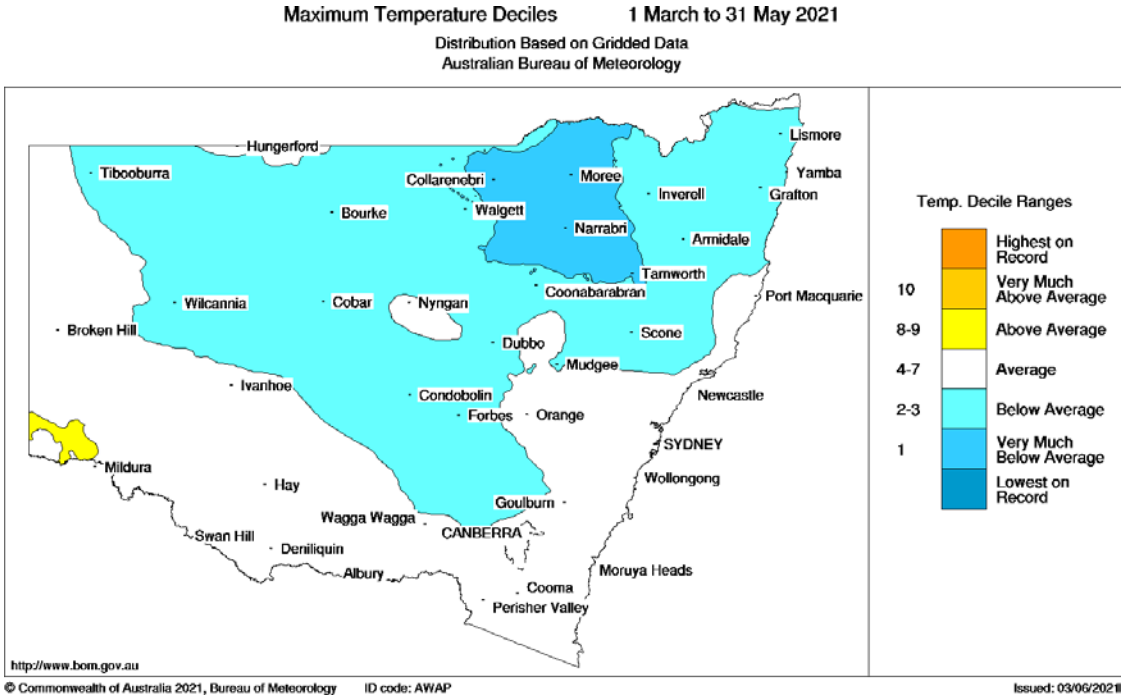

Figure 9 **NSW maximum temperature deciles for autumn, 1 March to 31 May 2021[8], showing temperatures very much below average in the Namoi/North West Slopes**

[8] NSW rainfall and temperature deciles for three months 1 March to 31 May 2021, Bureau of Meteorology, accessed June 2021.

[9] Regional autumn rainfall totals 2021 and 1-year to 3-year differences, Bureau of Meteorology, accessed June 2021.

[10] NSW maximum and minimum temperature anomaly, 1 March to 31 May 2021, Bureau of Meteorology, accessed June 2021.

Figure 10 shows rainfall and maximum and minimum temperatures[11], compared to long-term averages[12] at Gunnedah air quality monitoring station in autumn 2020–21. Maximum temperatures ranged from 16.1 to 31.8 ºC, with an average maximum temperature of 23.8 ºC compared to the long-term autumn mean maximum of 26.1 ºC. Minimum temperatures ranged from 0.8 to 20.7 ºC, with an average minimum temperature of 11.3 ºC compared to the long-term autumn mean minimum of 10.5 ºC. Rain was recorded on 24% of autumn days (22 days). Heaviest rainfall was associated with the passage of low-pressure systems and associated troughs and cold fronts[13].

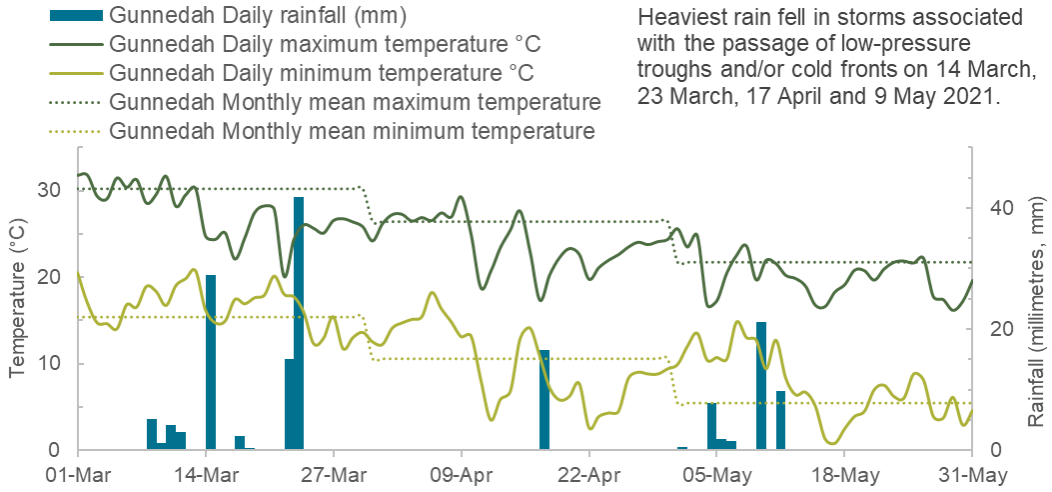

Figure 10 Gunnedah temperatures and rainfall in autumn 2021, showing heaviest rain in March

Wind

Wind directions across the North West Slopes generally align with the south-east to north-west direction of the Namoi and Peel River valleys[14]. Prevailing winds were generally light to moderate south-easterlies in autumn 2021. Narrabri recorded light and moderate to strong north to north-easterly winds (to 10.2 metres per second, m/s). Gunnedah recorded moderate winds predominately from the south-east (to 6.6 m/s) (Figure 11).

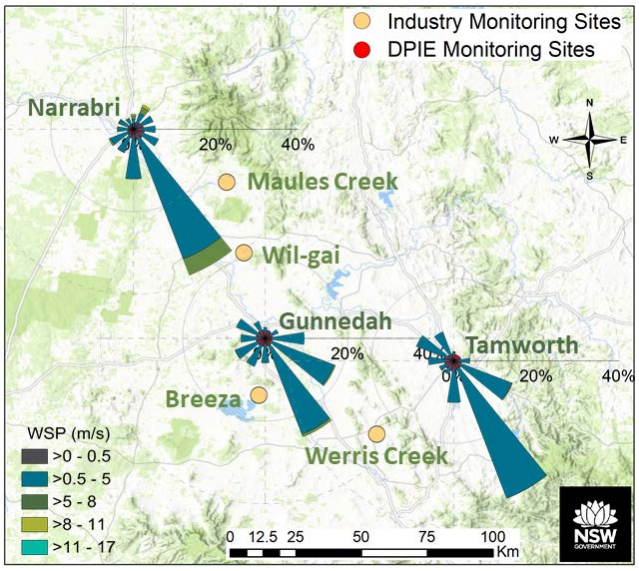

Figure 11 Wind rose map[15] for the Namoi/North West Slopes during autumn 2021, showing generally light south-easterly winds. Narrabri recorded stronger winds, from the north to north-east

[11] DPIE observations at Gunnedah air quality monitoring station. This data is not NATA accredited.

[12] Gunnedah summary climate statistics accessed June 2021.

[13] Synoptic weather charts archive, Bureau of Meteorology, accessed June 2021.

[14] The Namoi River flows north-west, through Gunnedah and Narrabri. The Peel River flows north-west through Tamworth, joining the Namoi River near Gunnedah.

[15] Wind roses show wind direction and speed at a location. The length of each bar around the circle shows the percentage of time that the wind blows from each direction. The colours along the bars indicate the wind speed categories.

Pollution roses

The pollution roses[16] for regional centres during autumn 2021 show higher hourly PM10 levels generally associated with south-easterly winds at all stations. Higher hourly PM10 levels also were associated with south-westerly winds at Gunnedah and west to north-westerly winds at Tamworth. Higher hourly PM2.5 levels were associated generally with south-easterly winds at all stations and as well as south-westerly winds at Gunnedah (Figure 12).

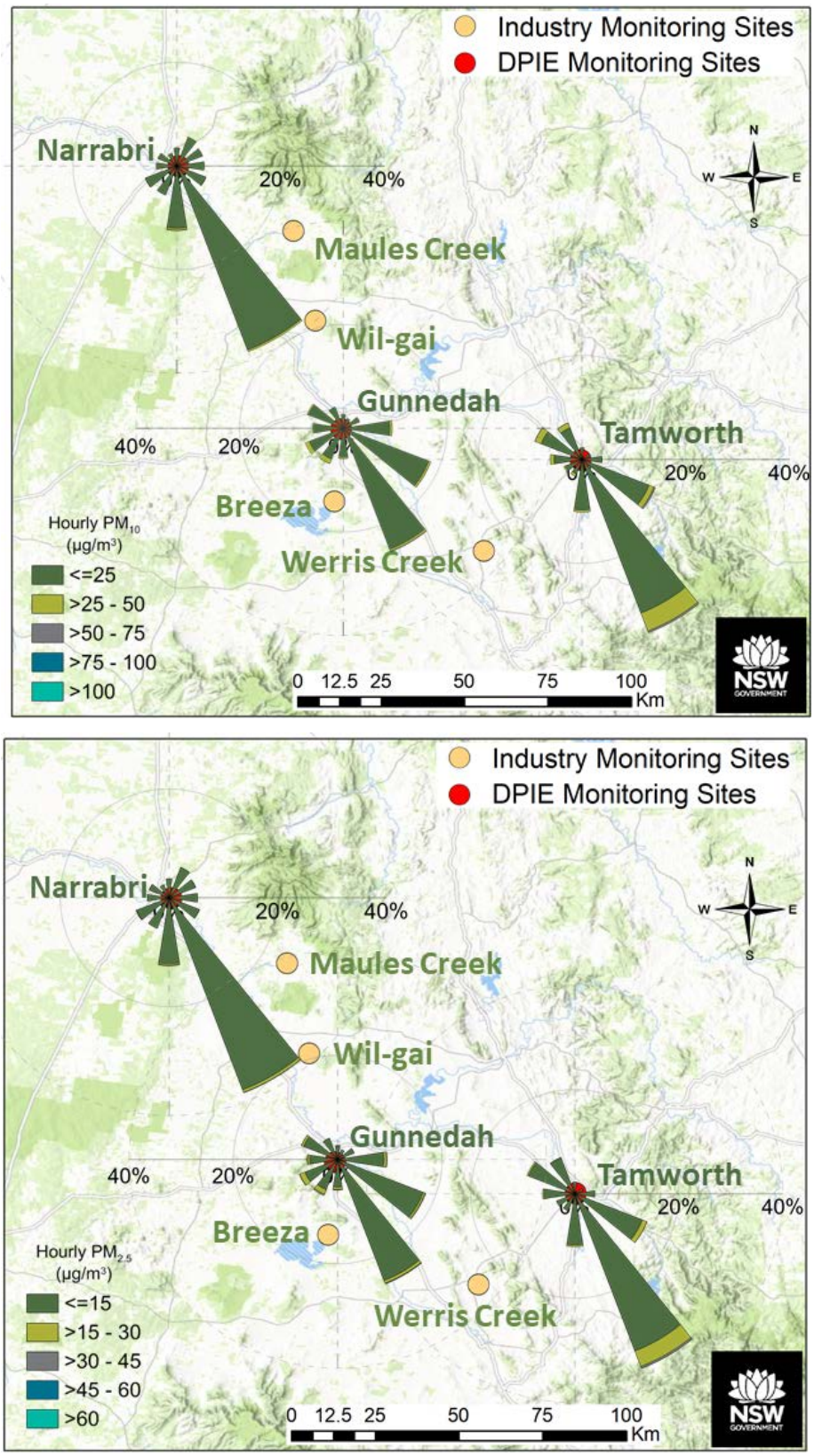

Figure 12 Pollution roses for hourly PM10 (top) and PM2.5 (bottom) in autumn 2021

[16] Pollution roses show the wind direction and particle levels at a location. The length of each bar around the circle shows the percentage of time the wind blows from each direction. The colours along the bars indicate the concentration of particle levels.

Online performance of monitoring stations, autumn 2021

The target performance for air quality monitoring at the Department of Planning, Industry and Environment sites is at least 95% data availability for all criteria pollutants and meteorological parameters. The maximum online time attainable for gases, NO_2 and O_3, is 96%, due to daily calibrations.

Table 2 presents online performance of monitoring stations at Gunnedah, Narrabri and Tamworth, from 1 March to 31 May 2021:

- all stations met online targets for monitoring meteorology
- Gunnedah and Tamworth met online targets for PM10 and PM2.5 monitoring.

Table 2 Online performance (%) from 1 March to 31 May 2020

Station	Particles PM10 daily	Particles PM2.5 daily	Gases NO_2 hourly	Gases O_3 hourly	Meteorology wind hourly
Gunnedah	100	100	94	93	100
Narrabri	91	91	-	-	100
Tamworth	100	99	-	61	100

'-' not monitored

Reduced online times were due to:

- Gunnedah Ozone and NO_2 – maintenance and calibration in March 2021
- Narrabri PM10 and PM2.5 – small beetle partially blocked air inlet, May 2021
- Tamworth Ozone – Rural ozone summertime project ceased monitoring on 29 April 2021.

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