

White Bay Cruise Terminal

Air Quality and Meteorological Monitoring
Report – December 2021

9 May 2022

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Signature Page

9 May 2022

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Air Quality and Meteorological Monitoring Report – December 2021



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1. INTRODUCTION

The Port Authority of New South Wales (NSW) has committed to undertaking air quality monitoring in the residential area adjacent to the White Bay Cruise Terminal (WBCT). This report presents a summary of monitoring data collected during December 2021.

For additional detail regarding the history of the monitoring program, the methodology, monitoring station equipment and technology, please refer to any of the monthly reports prior to February 2018.

2. AIR QUALITY DATA

The monitoring results are presented below with comparison to the ambient air quality criteria for SO₂ and PM_{2.5} provided in *The Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2017). The relevant averaging periods are 10 minutes, 1 hour and 24 hours for SO₂, and 24 hours for PM_{2.5}.

The 24-hour average SO₂ and PM_{2.5} concentrations are also compared with the data from several NSW Department of Planning and Environment (DPE) monitoring sites, formerly known as Office of Environment and Heritage (OEH).

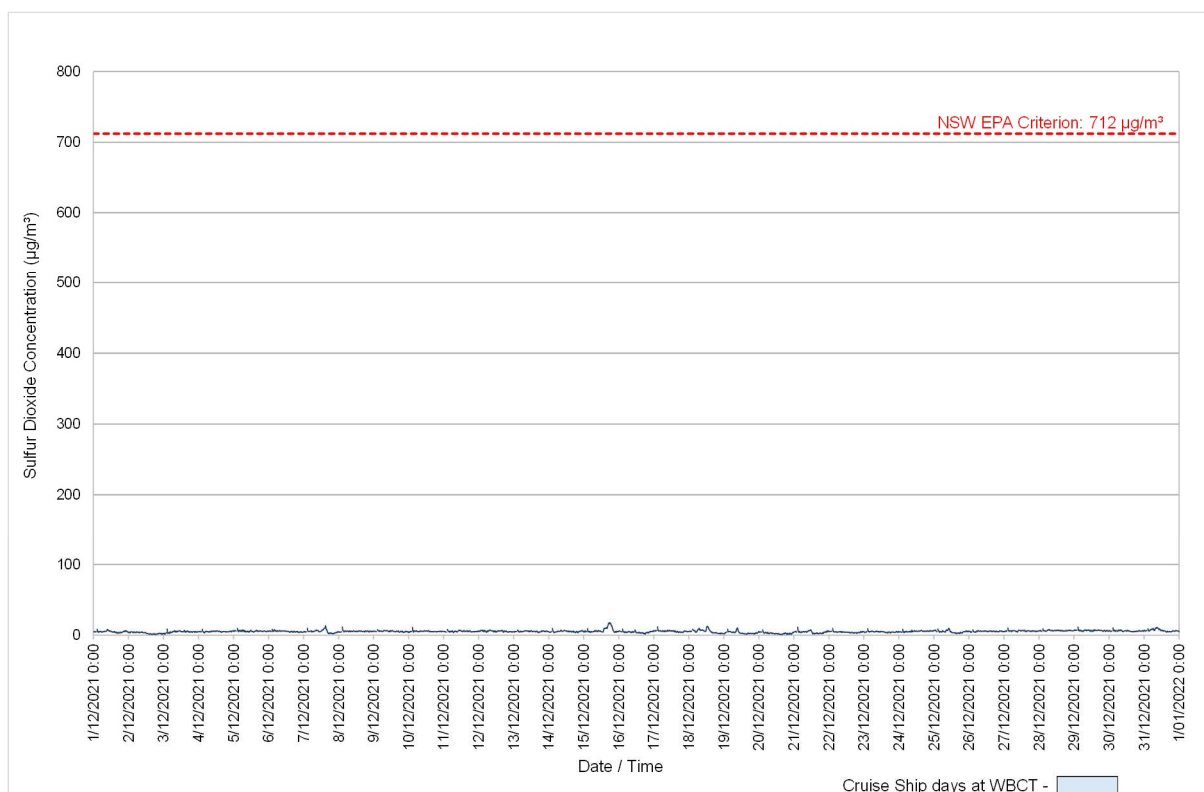
2.1 Cruise Ship Days

There were no cruise ships berthed during the month of December 2021 due to COVID-19 restrictions.

2.2 10-minute Average Sulfur Dioxide Concentrations

A time-series plot of 10-minute average SO₂ concentrations for December is provided in Figure 2-1. No exceedances of the 10-minute average air quality criterion for SO₂ were recorded during the reporting period.

The highest 10-minute average SO₂ concentration (18 µg/m³) was recorded on 15 December at 17:35 pm. This concentration is approximately 3% of the NSW Environmental Protection Authority (EPA) criterion.

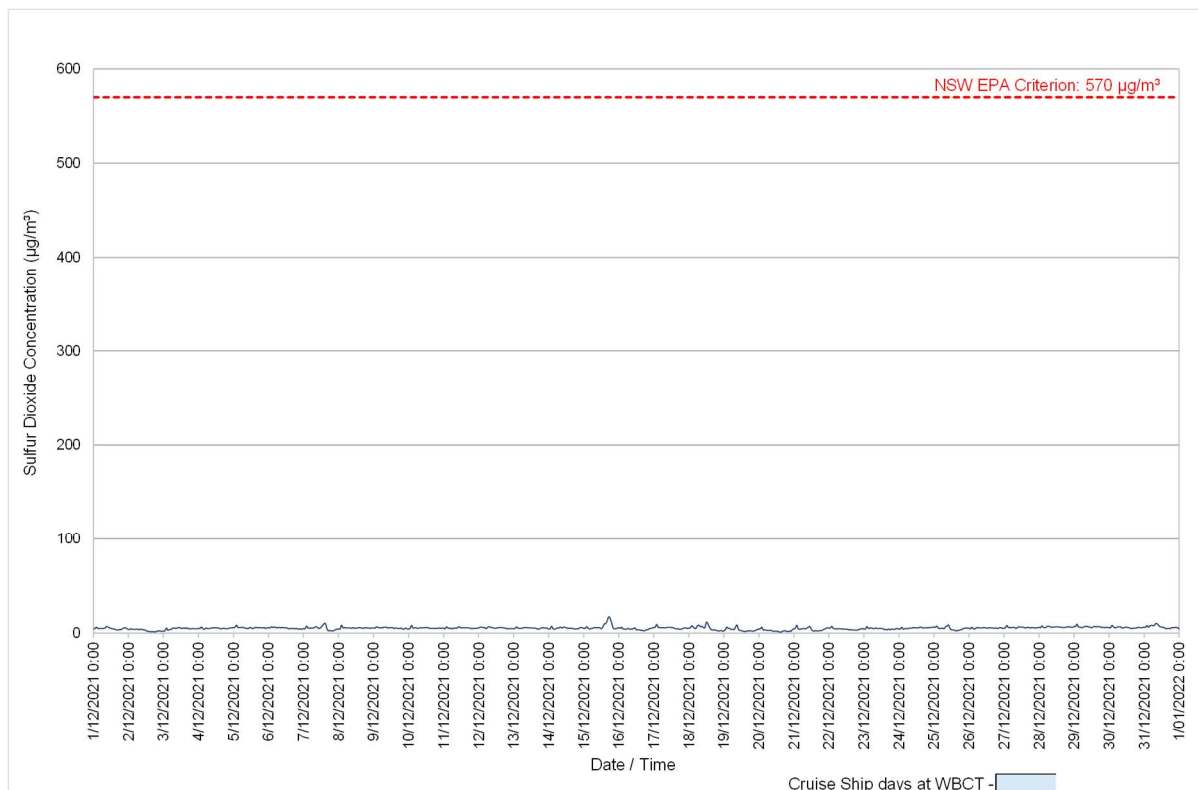


Note: Blue shading indicates cruise ship days, not arrival and departure times. Arrival and departure times are provided in Table 2.1.

Figure 2-1: 10-minute average SO₂ concentrations

2.3 1-hour Average Sulfur Dioxide Concentrations

A time series plot of the 1-hour average SO₂ concentration for December is shown in Figure 2-2. No exceedances of the 1-hour SO₂ criterion were recorded during the reporting period. The highest 1 hour average SO₂ concentration (17 µg/m³) was recorded on 15 December at 5 pm. This concentration is approximately 3% of the NSW EPA criterion.



Note: Blue shading indicates cruise ship days, not arrival and departure times. Arrival and departure times are provided in Table 2.1.

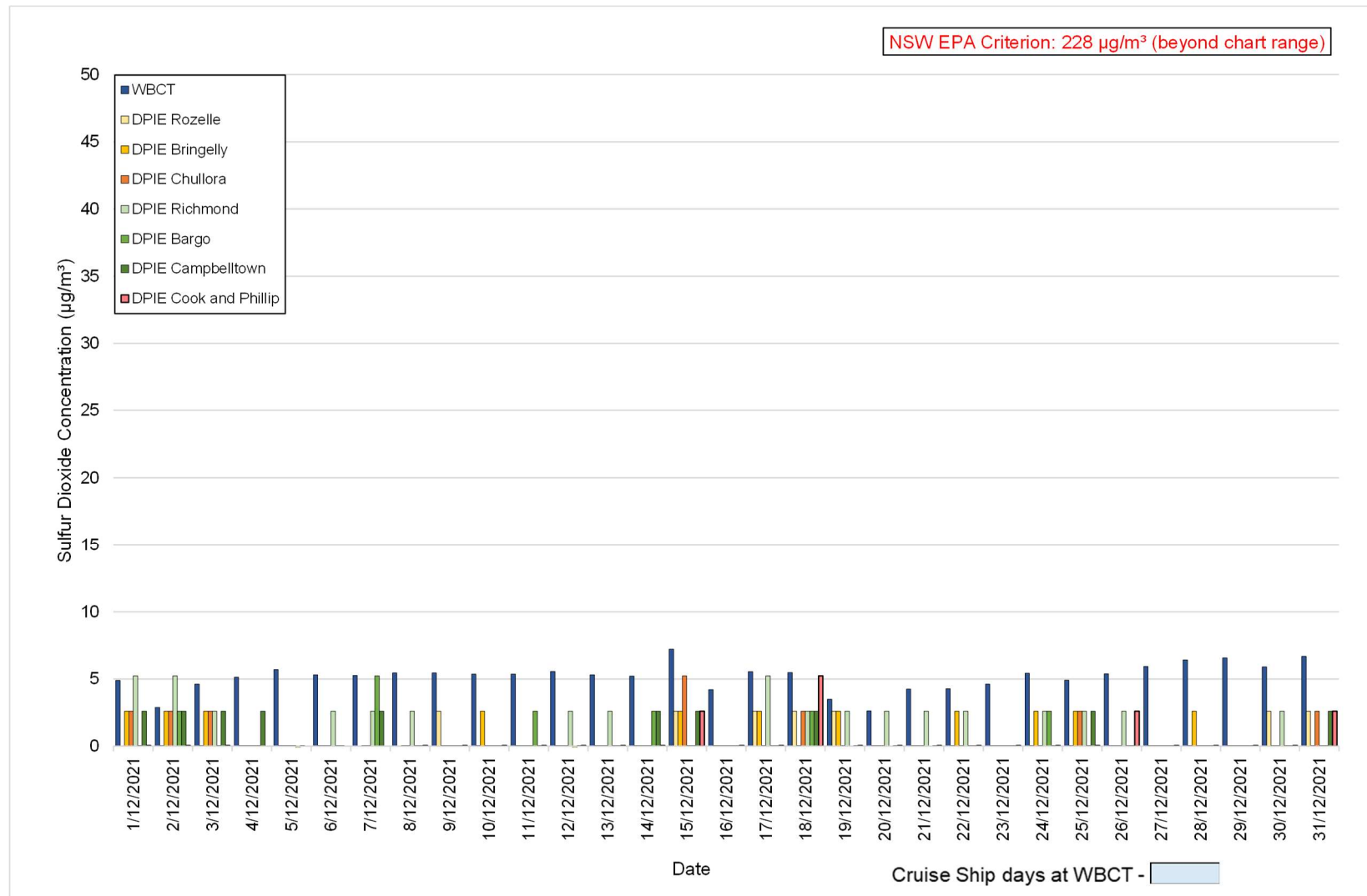
Figure 2-2: 1-hour average SO₂ concentrations

2.4 24-hour Average Sulfur Dioxide Concentrations

Time-series plots of 24-hour average SO₂ concentrations at WBCT and selected NSW DPE urban background sites in Sydney are shown in Figure 2-3.

The selected DPE monitoring sites that measure SO₂ include Rozelle, Bringelly, Chullora, Richmond, Bargo, Campbelltown and Cook and Phillip Park (Sydney CBD). 24-hour average SO₂ concentrations measured at White Bay are within the EPA criterion and are shown against those measured by DPE stations in the region.

The highest 24-hour average SO₂ concentration (7 µg/m³) was recorded on 15 December. This concentration is approximately 3% of the NSW EPA criterion.



Note: Blue shading indicates cruise ship days, not arrival and departure times. Arrival and departure times are provided in Table 2.1. Zero data are graphed with a minor accentuation for visual purposes.

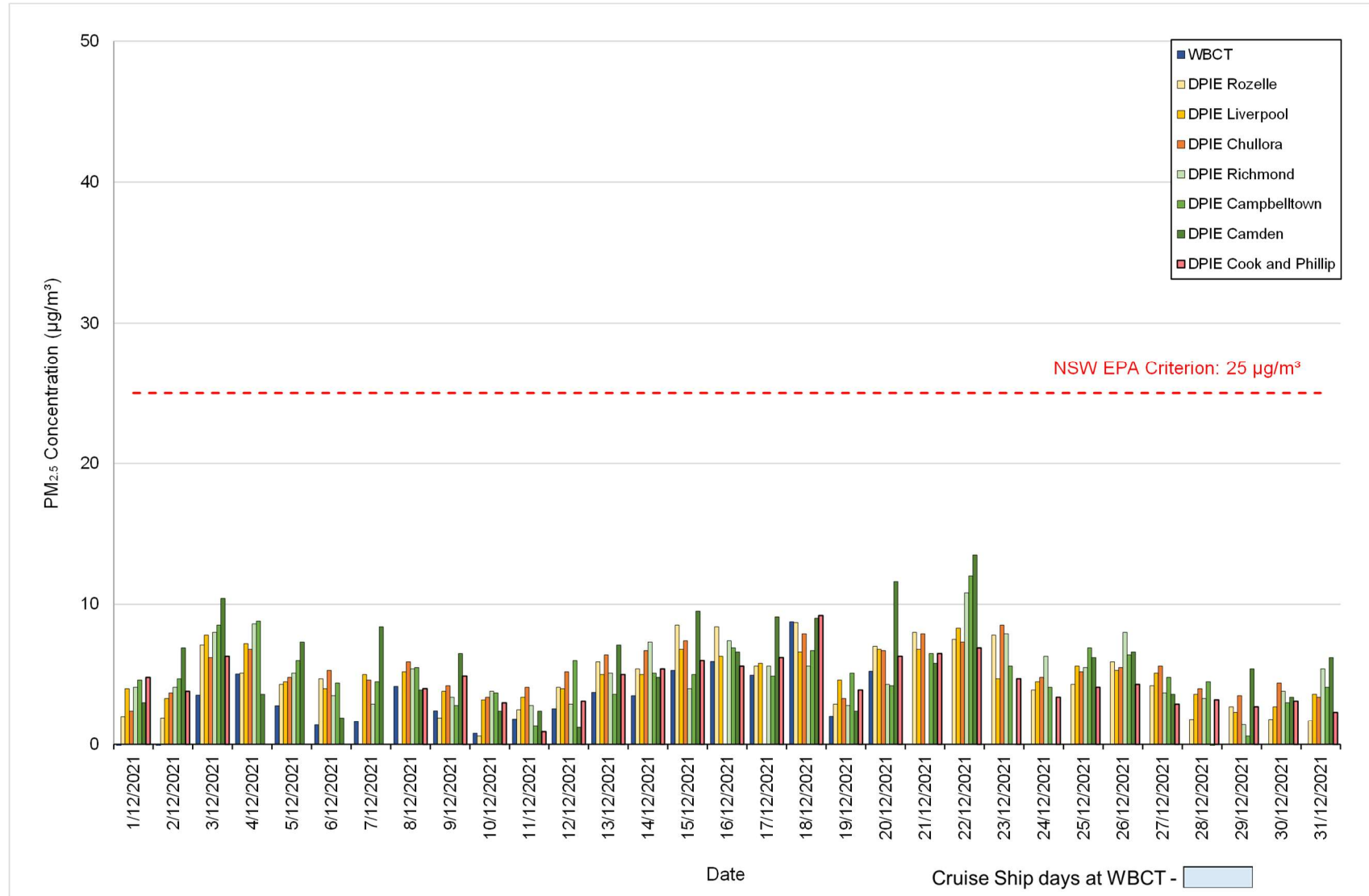
Figure 2-3: 24-hour average SO₂ concentrations at WBCT and DPE monitoring sites

2.5 24-hour Average PM_{2.5} Concentrations

Time-series plots of 24-hour average PM_{2.5} concentrations at WBCT and selected DPE monitoring sites are shown in Figure 2-4.

Of the DPE sites in Sydney, PM_{2.5} is measured at a range of locations, including Rozelle, Liverpool, Chullora, Richmond, Campbelltown, Camden and Cook and Phillip. The highest 24-hour average PM_{2.5} concentration (9 µg/m³) was recorded on 18 December. This concentration is approximately 36% of the NSW EPA criterion.

It is noted that PM_{2.5} measurements were not available at WBCT from the 21st of December due to an instrument failure.



Note: Blue shading indicates cruise ship days, not arrival and departure times. Arrival and departure times are provided in Table 2.1.

Figure 2-4: 24-hour average PM_{2.5} concentration at WBCT and DPE monitoring sites

2.6 Summary Statistics

Summary statistics for the SO₂ and PM_{2.5} concentrations at WBCT are shown in Table 2-1.

Table 2-1: Summary statistics for SO₂ and PM_{2.5} concentrations at WBCT (µg/m³)

Pollutant:	SO ₂			PM _{2.5}
Averaging period:	10 minute	1 hour	24 hour	24 hour
Criterion:	712	570	228	25
Mean	5	5	5	3
Median	5	5	5	3
Standard deviation	2	2	1	2
Sample variance	3	2	1	5
Range	17	16	5	10
Minimum	1	1	3	-1
Maximum	18	17	7	9
Maximum (cruise ship day)	N/A	N/A	N/A	N/A

Note: N/A – Not Applicable due to the absence of cruise ships during the month of December.

3. METEOROLOGICAL DATA

A wind rose showing the frequency of counts by wind direction for the reporting period is shown in Figure 3-1. Guidance on the interpretation of wind roses is provided in the monthly reports prior to March 2018.

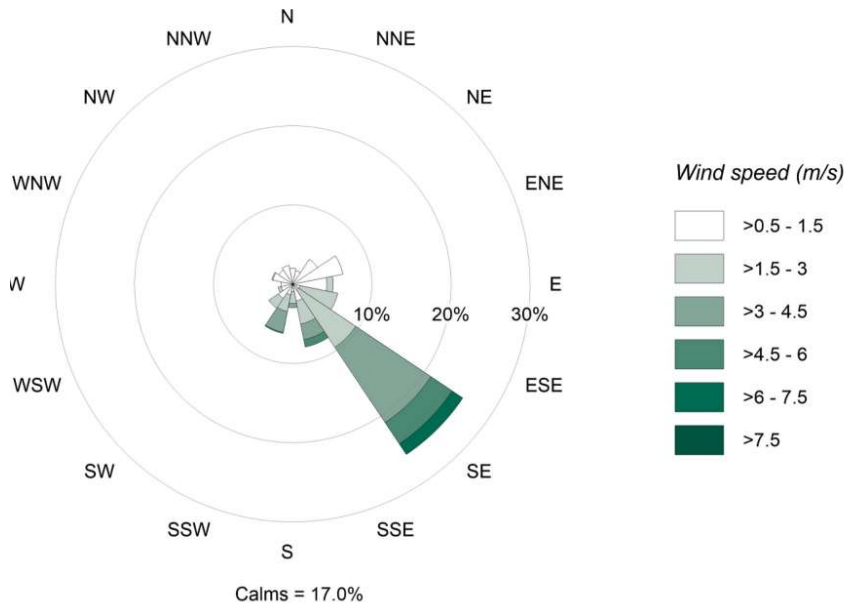


Figure 3-1: Wind rose for the reporting period

4. DATA AVAILABILITY

Data availability for SO₂ and PM_{2.5} during the reporting period, based on the 5-minute average values, is shown in Table 4-1. An output summary and data distribution for 5-minute values of wind speed (m/s), wind direction, SO₂ (µg/m³) and PM_{2.5} (µg/m³) concentrations are shown in Figure 4-1. Blue bars below each parameter represent captured data and the red bars represent missing data.

It is noted that PM_{2.5} measurements were not available at WBCT from the 21st of December due to an instrument failure.

Table 4-1: Data availability and summary statistics for SO₂ and PM_{2.5}

Statistic	SO ₂ (5-minute)	PM _{2.5} (1-hour)
Possible values	8556	744
Missing values	189	274
Availability (%)	98	63
95 th percentile (µg/m ³)	7	10

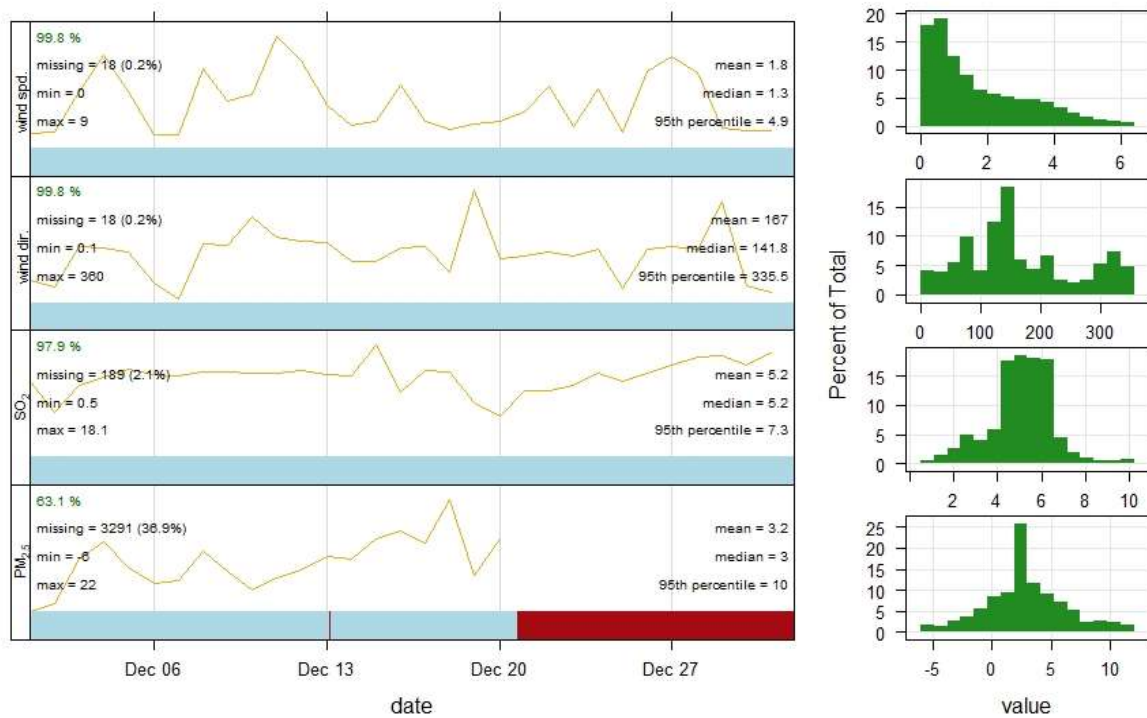


Figure 4-1: Output summary and data distribution

5. REFERENCES

NSW Environmental Protection Authority (EPA). 2017. *The Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*, New South Wales Environment Protection Authority, January 2017.