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Report

WHITE BAY CRUISE TERMINAL: AIR QUALITY AND METEOROLOGICAL MONITORING REPORT – OCTOBER 2018

Port Authority of NSW

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1 INTRODUCTION

The Port Authority of 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 October 2018.

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 SO_2 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 SO_2, and 24 hours for $PM_{2.5}$.

The 24-hour average SO_2 and $PM_{2.5}$ concentrations are also compared with the data from several Office of Environment and Heritage (OEH) monitoring sites.

2.1 Cruise ship days

Cruise ship days as provided by Port Authority of NSW are shown in **Table 2.1**. There were 6 days where a cruise ship was berthed at WBCT in October.

Table 2.1: Cruise ship days

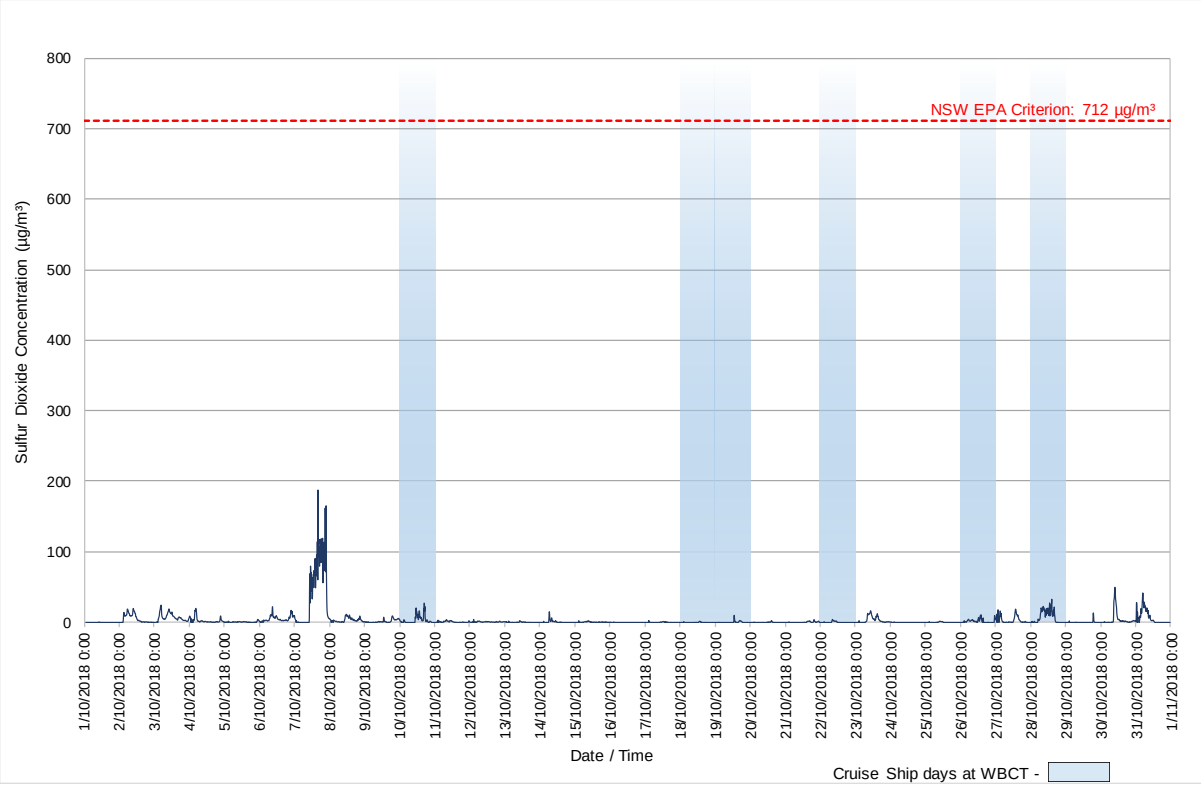
Arrival*	Departure*	Vessel Name	Berth
10/10/2018 10:18	10/10/2018 17:03	Pacific Eden	WHT5
18/10/2018 9:22	18/10/2018 17:50	Pacific Explorer	WHT5
19/10/2018 13:30	19/10/2018 22:02	Pacific Eden	WHT5
22/10/2018 6:30	22/10/2018 16:55	Pacific Eden	WHT5
26/10/2018 8:32	26/10/2018 16:21	Pacific Eden	WHT5
28/10/2018 6:53	28/10/2018 16:10	Sea Princess	WHT5

*Shipping times provided in local time. Local standard time used elsewhere.

2.2 10-minute average sulfur dioxide concentrations

A time-series plot of 10-minute average SO_2 concentrations for October 2018 is shown in **Figure 2.1**. No exceedances of the 10-minute average air quality criterion for SO_2 were recorded during the reporting period.

The highest 10-minute average SO_2 concentration (187 µg/m^3) was recorded on 7 October at 16:00 pm, at a time when there was no cruise ship berthed. This concentration is approximately 26% of the NSW EPA criterion.

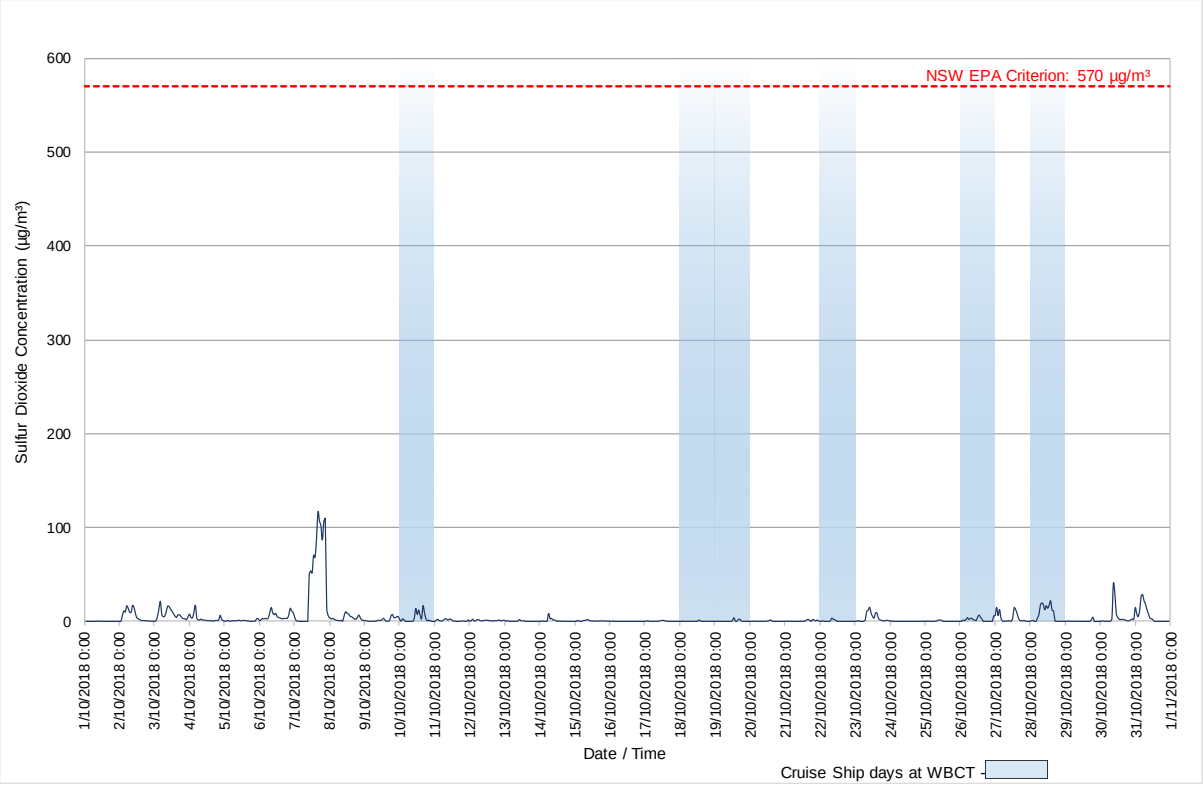


Note: Blue shading indicates cruise ship days, not arrival and departure times. Arrival and departure times are provided in **Table 2.1.**

Figure 2.1: 10-minute average SO_2 concentrations

2.3 1-hour average sulfur dioxide concentrations

A time series plot of the 1-hour average SO_2 concentration for October 2018 is shown in **Figure 2.2**. No exceedances of the 1-hour air quality criterion for SO_2 were recorded during the reporting period. The highest 1-hour average SO_2 concentration (116 µg/m³) was recorded on 7 October at 16:00 pm, at a time when there was no cruise ship berthed. This concentration is approximately 20% of the NSW EPA criterion.



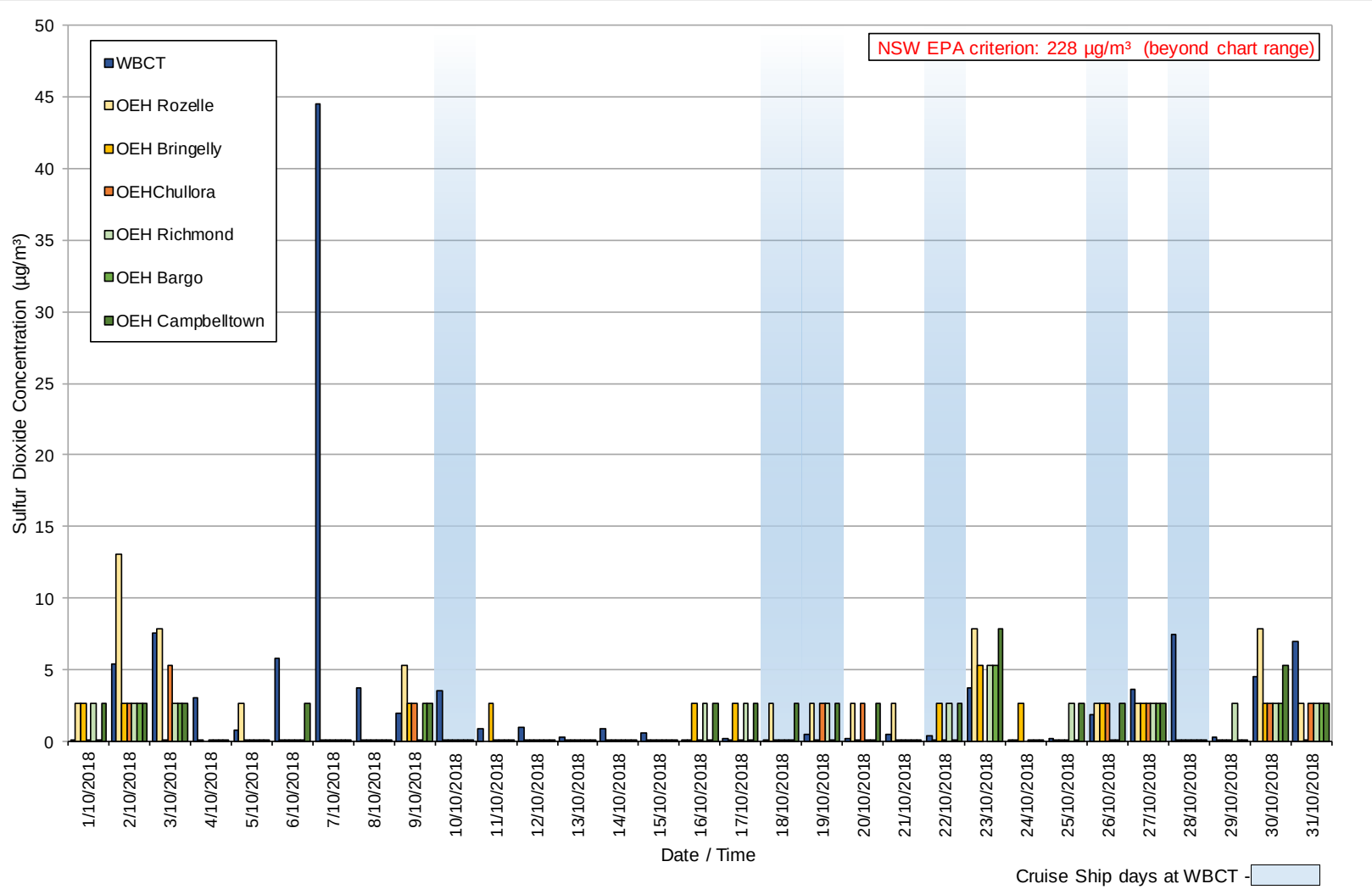
Note: Blue shading indicates cruise ship days, not arrival and departure times. Arrival and departure times are provided in **Table 2.1.**

Figure 2.2: 1-hour average SO_2 concentrations

2.4 24-hour average sulfur dioxide concentrations

Time-series plots of 24-hour average SO_2 concentrations at WBCT and selected OEH urban background sites in Sydney are shown in **Figure 2.3**. The selected OEH sites that measure SO_2 include Rozelle, Bringelly, Chullora, Richmond, Bargo and Campbelltown.

The highest 24-hour average SO_2 concentration (44 µg/m³) was recorded on 7 October, at a time when there was no cruise ship berthed.



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

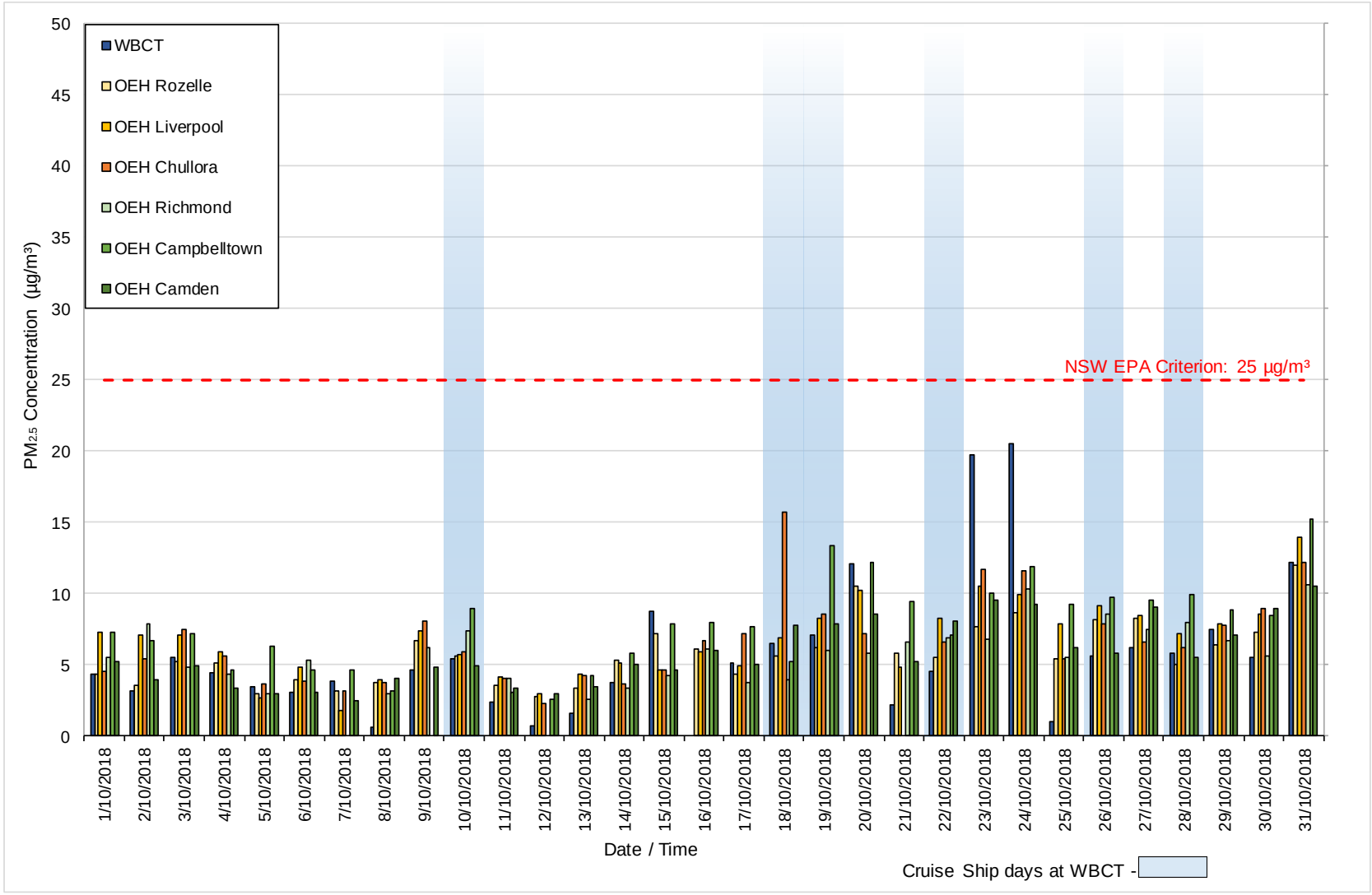
Zero data are graphed with a minor accentuation for visual purposes.

Figure 2.3: 24-hour average SO_2 concentrations at WBCT and OEH 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 OEH sites are shown in **Figure 2.4**. Of the OEH sites in Sydney, $PM_{2.5}$ is measured at a range of locations, including Rozelle, Liverpool, Chullora, Richmond, Campbelltown and Camden.

There were no exceedances of the NSW EPA 24-hour $PM_{2.5}$ concentration criterion (25 µg/m^3). The highest 24-hour $PM_{2.5}$ concentration (20 µg/m^3) was recorded on 24 October, which occurred at a time when there was no cruise ship berthed at WBCT.



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 $PM_{2.5}$ concentrations at WBCT and OEH sites

2.6 Summary statistics

Summary statistics for the SO_2 and $PM_{2.5}$ concentrations at WBCT are shown in **Table 2-2**.

Table 2.2: Summary statistics for SO_2 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	4	3	4	6
Median	0	0	1	5
Standard deviation	12	12	8	5
Sample variance	148	135	61	22
Range	187	117	44	20
Minimum	0	0	0	1
Maximum	187	117	44	21
Maximum (cruise ship day)	33	22	7	7

3 METEOROLOGICAL DATA

3.1 Wind Rose

A wind rose showing the frequency of counts by wind direction for the reporting period are shown in Figure 3.1. Guidance on the interpretation of wind roses is provided in the monthly reports prior to February 2018.

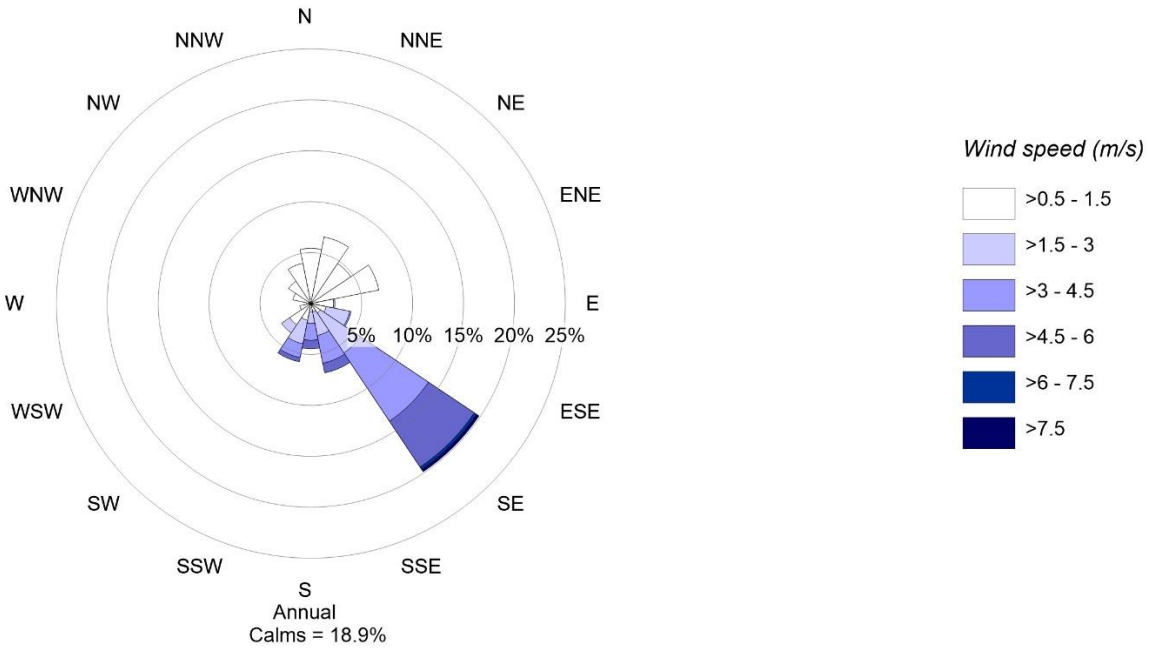


Figure 3.1 Wind Rose for the reporting period.

4 DATA AVAILABILITY

Data availability for SO_2 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, SO_2 (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.

Table 4.1 Data availability and summary statistics for SO2 and PM2.5a (5-minute reported values)

Statistic	SO_2	$PM_{2.5}$
Possible values	8626	7024
Missing values	297	1899
Availability (%)	96.7	78.7
95th percentile (µg/m³)	14.7	13

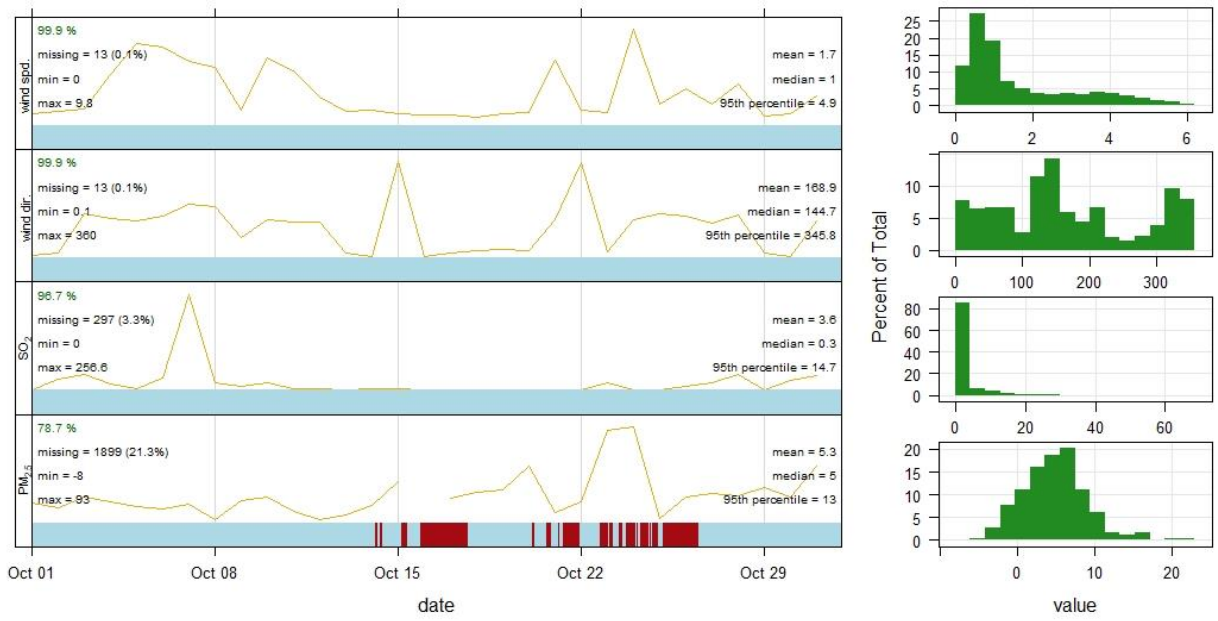


Figure 4.1 Output Summary and Data Distribution

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.