PORT AUTHORITY
OF NEW SOUTH WALES

White Bay Cruise Terminal

Air Quality and Meteorological Monitoring Report – March 2020

29 April 2020

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White Bay Cruise Terminal

Air Quality and Meteorological Monitoring Report – March 2020

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CONTENTS

List of Tables

List of Figures

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 March 2020.

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 NSW Department of Planning, Industry and Environment (DPIE) monitoring sites, formerly known as Office of Environment and Heritage (OEH).

2.1 Cruise Ship Days

Cruise ship days as provided by Port Authority of NSW are shown in Table 2-1. There were 25 days where a cruise ship was berthed at WBCT in the month of March. There were eight occasions where a ship was berthed overnight. There were five occasions where two cruise ships were berthed at the same time in different wharfs (WHT4 & WHT5).

Table 2-1: Cruise ship days

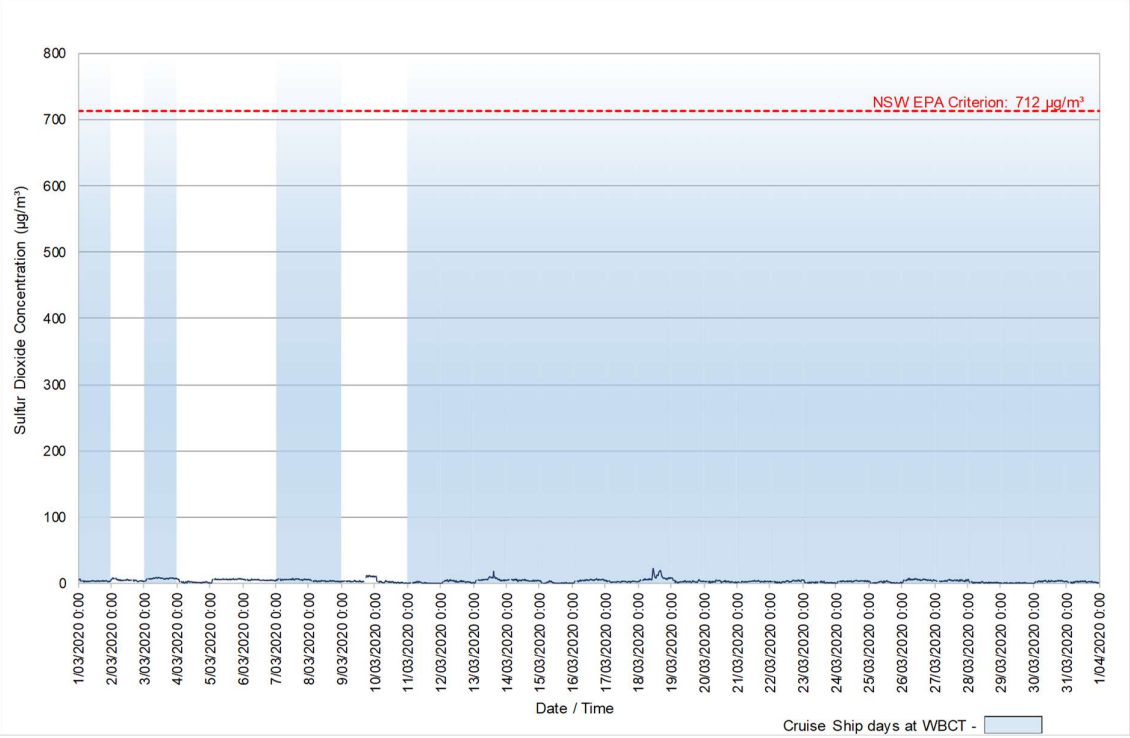
Arrival*	Departure*	Vessel Name	Berth
1/03/2020 6:21	1/03/2020 18:54	Explorer Dream	WHT4
3/03/2020 6:37	3/03/2020 18:10	Silver Muse	WHT5
7/03/2020 7:44	8/03/2020 18:01	Amsterdam	WHT5 & 4
8/03/2020 6:40	8/03/2020 20:09	Seabourn Encore	WHT5
11/03/2020 7:40	13/03/2020 16:40	Pacific Explorer	WHT5
12/03/2020 8:30	15/03/2020 22:38	Artania	WHT4
16/03/2020 7:37	17/03/2020 16:29	Pacific Explorer	WHT5
18/03/2020 4:51	18/03/2020 16:05	Sea Princess	WHT5
18/03/2020 19:20	20/03/2020 18:19	Silver Whisper	WHT4 & 5
18/03/2020 22:56	19/03/2020 10:30	Sea Princess	WHT5
21/03/2020 7:25	2/04/2020 15:18	Pacific Explorer	WHT4
21/03/2020 9:11	31/03/2020 21:35	Sun 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 March is provided 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 (22 µg/m^3) was recorded on 18 March at 11:10 am, at a time when there was a cruise ship berthed. This concentration is approximately 3% of the NSW Environmental Protection Authority (EPA) criterion.

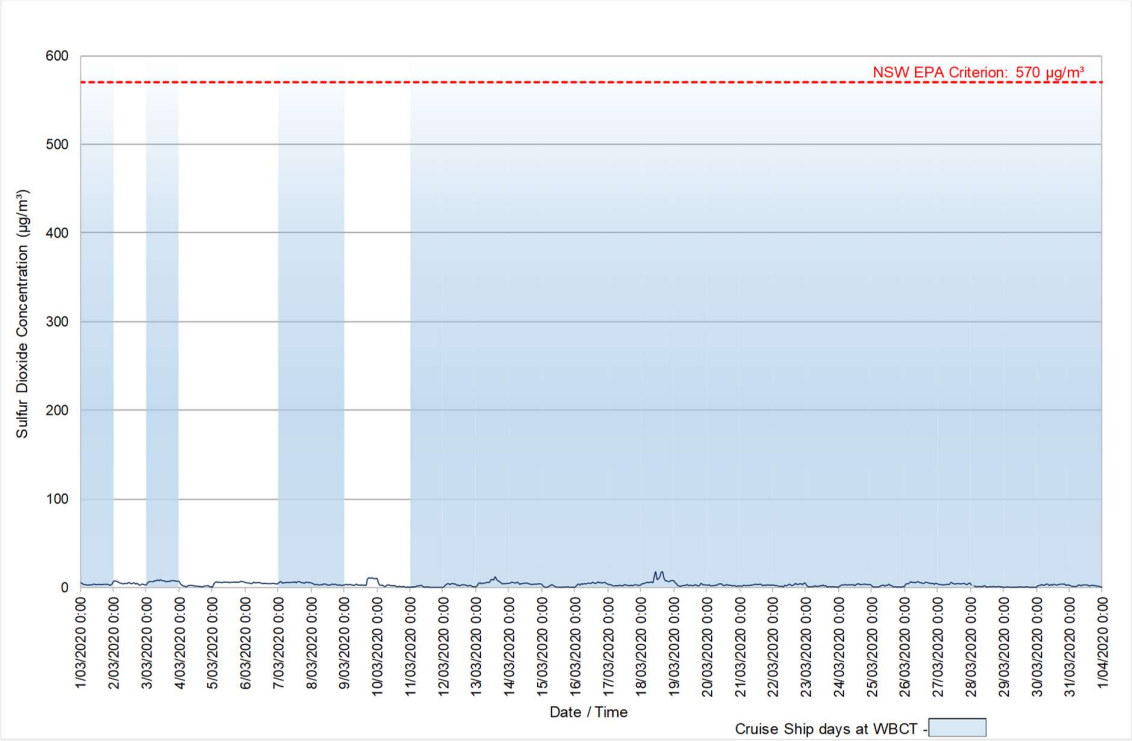


Note: Blue shading indicates cruise ship days, not arrival and departure times. Arrival and departure times are provided in Table 2.1.

Figure 2-1: 10-minute average SO_2 concentrations

2.3 1-hour Average Sulfur Dioxide Concentrations

A time series plot of the 1-hour average SO_2 concentration for March 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 (18 µg/m^3) was recorded on 18 March at 11am, at a time when there was a cruise ship berthed. 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.

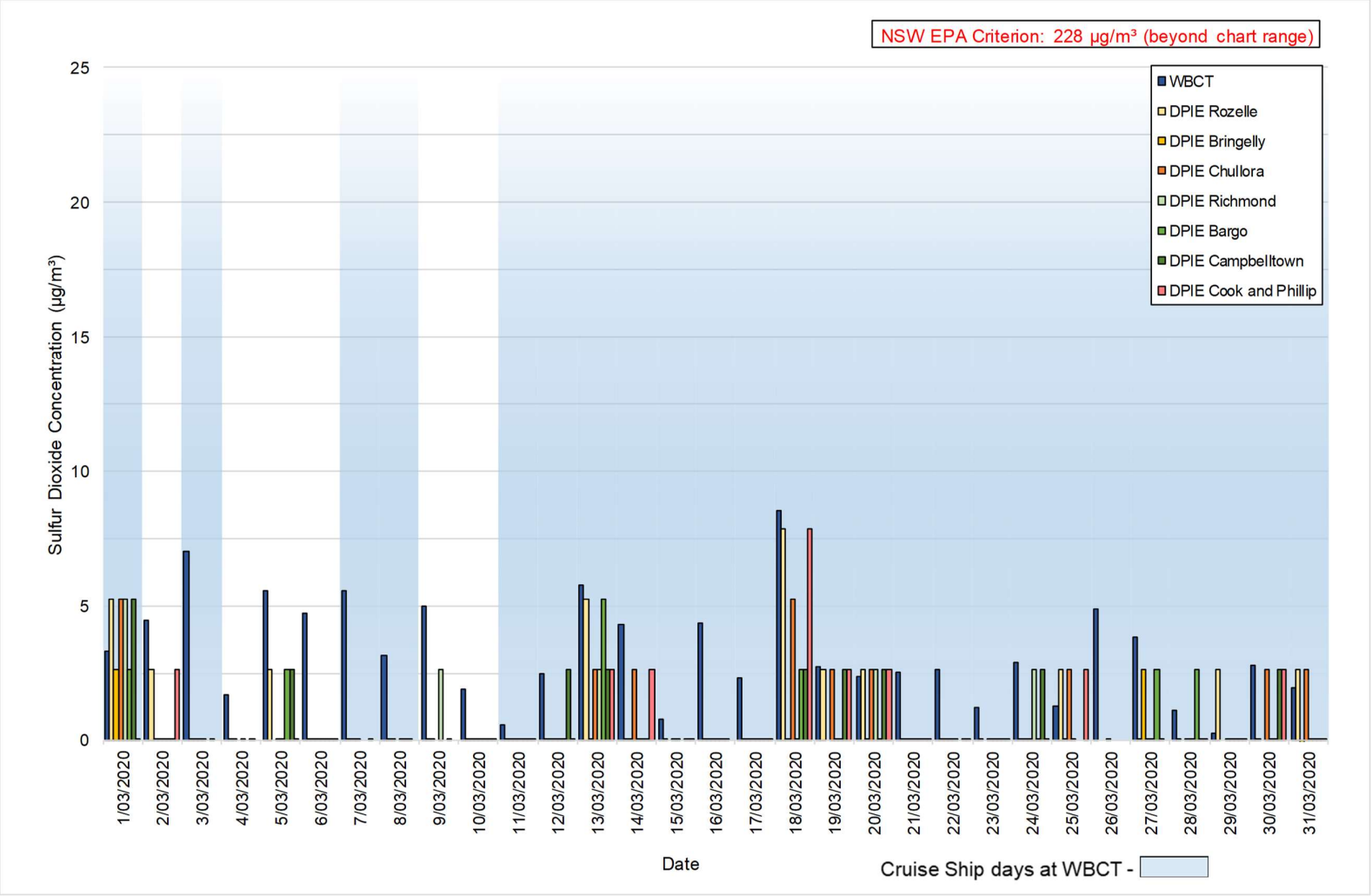
Figure 2-2: 1-hour average SO_2 concentrations

2.4 24-hour Average Sulfur Dioxide Concentrations

Time-series plots of 24-hour average SO_2 concentrations at WBCT and selected NSW DPIE urban background sites in Sydney are shown in Figure 2-3.

The selected DPIE monitoring sites that measure SO_2 include Rozelle, Bringelly, Chullora, Richmond, Bargo, Campbelltown and Cook and Phillip Park (Sydney CBD). 24-hour average SO_2 concentrations measured at White Bay are within the EPA criterion and are shown against those measured by DPIE stations in the region.

The highest 24-hour average SO_2 concentration (9 µg/m³) was recorded on 18 March, at a time when there was a cruise ship berthed.



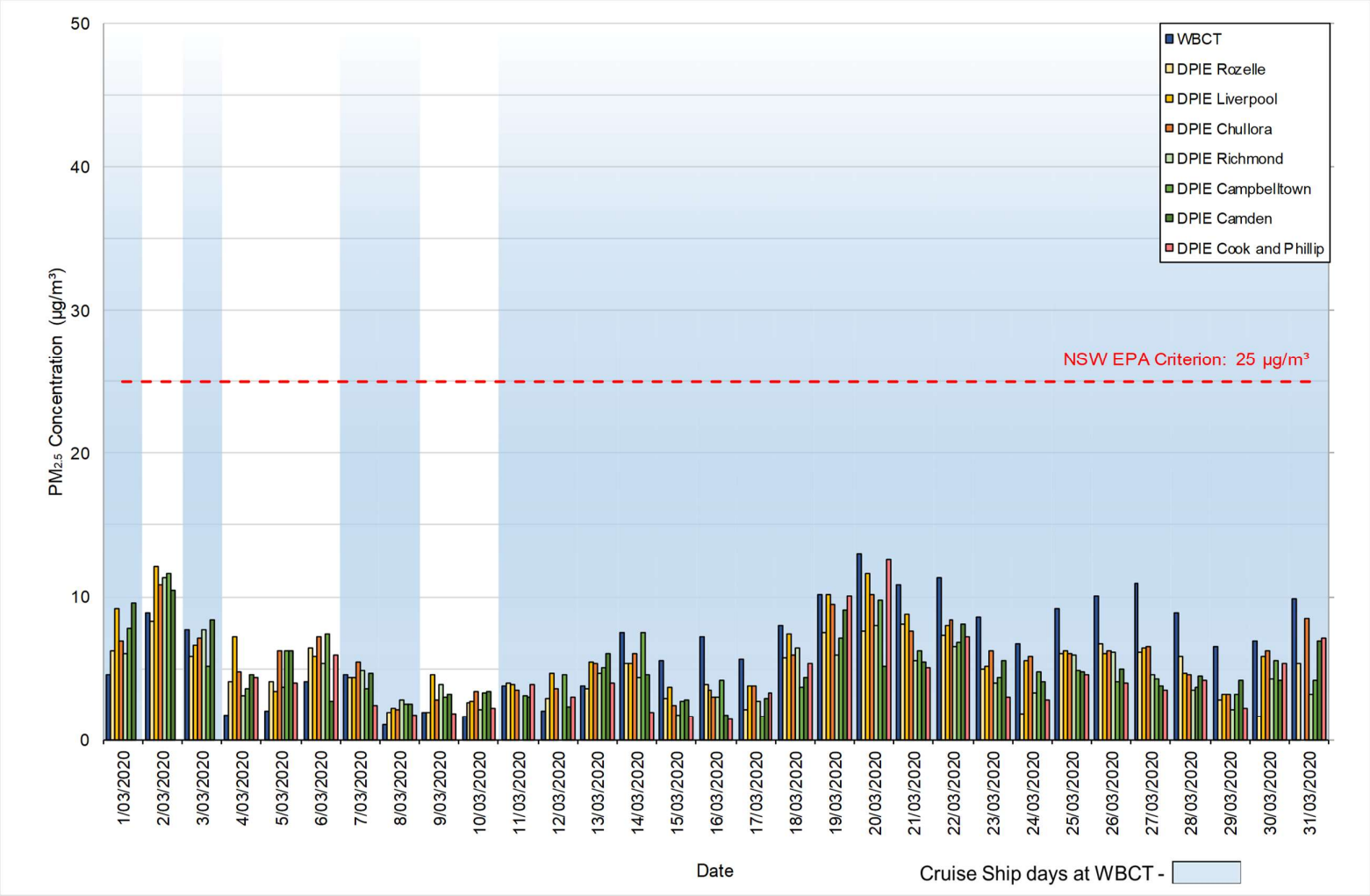
Note: Blue shading indicates cruise ship days, not arrival and departure times. Arrival and departure times are provided in Table 2.1. Zero data are graphed with a minor accentuation for visual purposes.

Figure 2-3: 24-hour average SO_2 concentrations at WBCT and DPIE 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 DPIE monitoring sites are shown in Figure 2-4. Of the DPIE sites in Sydney, $PM_{2.5}$ is measured at a range of locations, including Rozelle, Liverpool, Chullora, Richmond, Campbelltown, Camden and Cook and Phillip.

There were no exceedances of the NSW EPA 24-hour $PM_{2.5}$ criterion (25 µg/m^3) in the month of March.



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 DPIE monitoring 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	3	3	3	7
Median	3	3	3	7
Standard deviation	2	2	2	3
Sample variance	6	6	4	11
Range	22	18	8	12
Minimum	0	0	0	1
Maximum	22	18	9	13
Maximum (cruise ship day)	22	18	9	13

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.

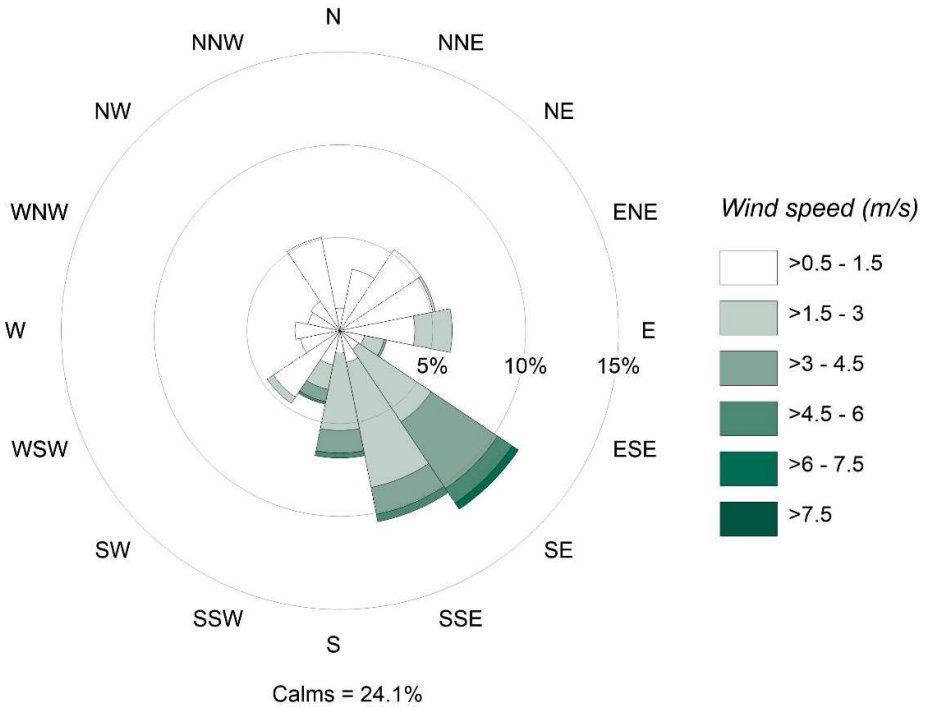


Figure 3-1: Wind rose for the reporting period

4. DATA AVAILABILITY

Data availability for 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/m^3) and $PM_{2.5}$ (µg/m^3) 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 SO_2 and $PM_{2.5}$ (5-minute reported values)

Statistic	SO_2	$PM_{2.5}$
Possible values	8445	8892
Missing values	484	37
Availability (%)	94.6	99.6
95th percentile (µg/m^3)	7.3	15

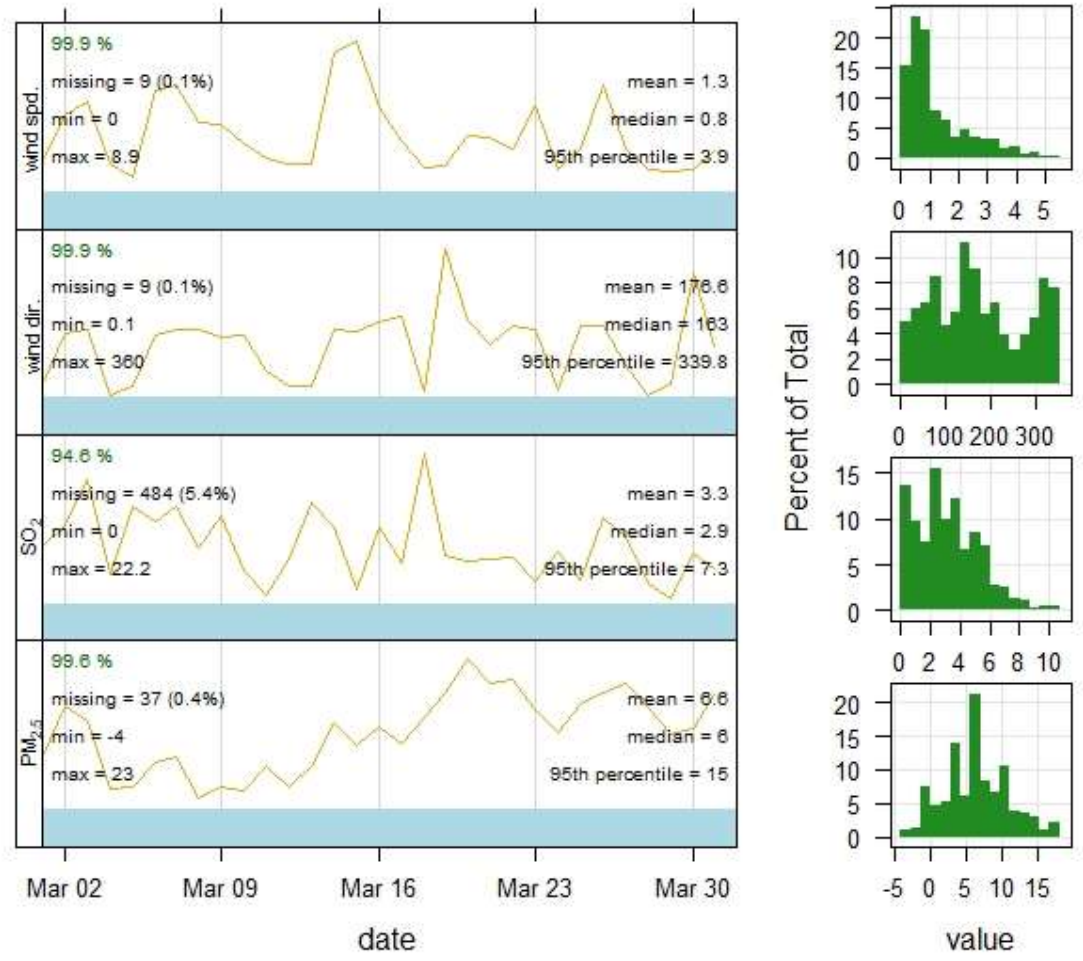


Figure 4-1: Output summary and data distribution

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, March 2017.