



# White Bay Cruise Terminal

Air Quality and Meteorological Monitoring  
Report – December 2020

4 February 2021

Project No.: 0429140

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Air Quality and Meteorological Monitoring Report – December 2020

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## CONTENTS

<b>1.</b>	<b>INTRODUCTION .....</b>	<b>2</b>
<b>2.</b>	<b>AIR QUALITY DATA .....</b>	<b>3</b>
2.1	Cruise Ship Days .....	3
2.2	10-minute Average Sulfur Dioxide Concentrations .....	3
2.3	1-hour Average Sulfur Dioxide Concentrations .....	4
2.4	24-hour Average Sulfur Dioxide Concentrations .....	4
2.5	24-hour Average PM <sub>2.5</sub> Concentrations .....	6
2.6	Summary Statistics .....	9
<b>3.</b>	<b>METEOROLOGICAL DATA .....</b>	<b>10</b>
<b>4.</b>	<b>DATA AVAILABILITY .....</b>	<b>11</b>
<b>5.</b>	<b>REFERENCES .....</b>	<b>12</b>

### List of Tables

Table 2-1: Summary statistics for SO <sub>2</sub> and PM <sub>2.5</sub> concentrations at WBCT (µg/m <sup>3</sup> ) .....	9
Table 4-1: Data availability and summary statistics for SO <sub>2</sub> and PM <sub>2.5</sub> .....	11

### List of Figures

Figure 2-1: 10-minute average SO <sub>2</sub> concentrations.....	3
Figure 2-2: 1-hour average SO <sub>2</sub> concentrations .....	4
Figure 2-3: 24-hour average SO <sub>2</sub> concentrations at WBCT and DPIE monitoring sites.....	5
Figure 2-4: 24-hour average PM <sub>2.5</sub> concentration at WBCT and DPIE monitoring sites.....	7
Figure 3-1: Wind rose for the reporting period .....	10
Figure 4-1: Output summary and data distribution.....	11

## 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 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<sub>2</sub> and PM<sub>2.5</sub> 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<sub>2</sub>, and 24 hours for PM<sub>2.5</sub>.

The 24-hour average SO<sub>2</sub> and PM<sub>2.5</sub> 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).

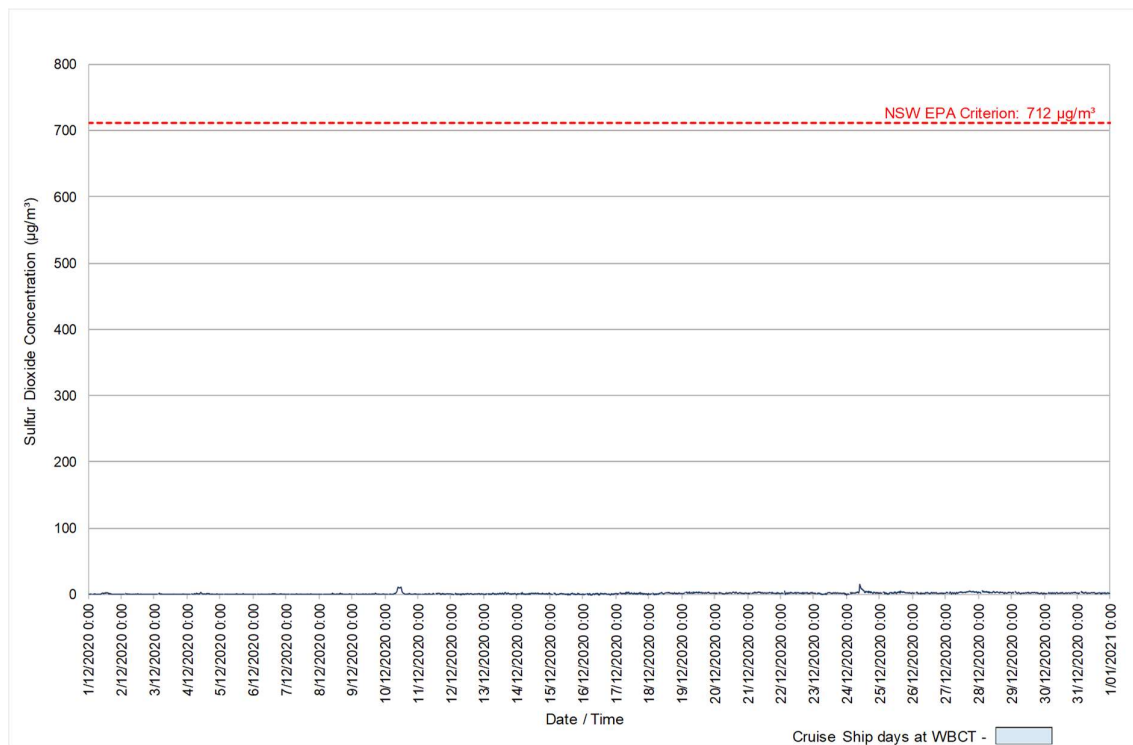
### 2.1 Cruise Ship Days

There were no cruise ships berthed during the month of December 2020 due to the COVID-19 restrictions.

### 2.2 10-minute Average Sulfur Dioxide Concentrations

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

The highest 10-minute average SO<sub>2</sub> concentration (15 µg/m<sup>3</sup>) was recorded on 24 December at 9:40 am. This concentration is approximately 2% of the NSW Environmental Protection Authority (EPA) criterion.

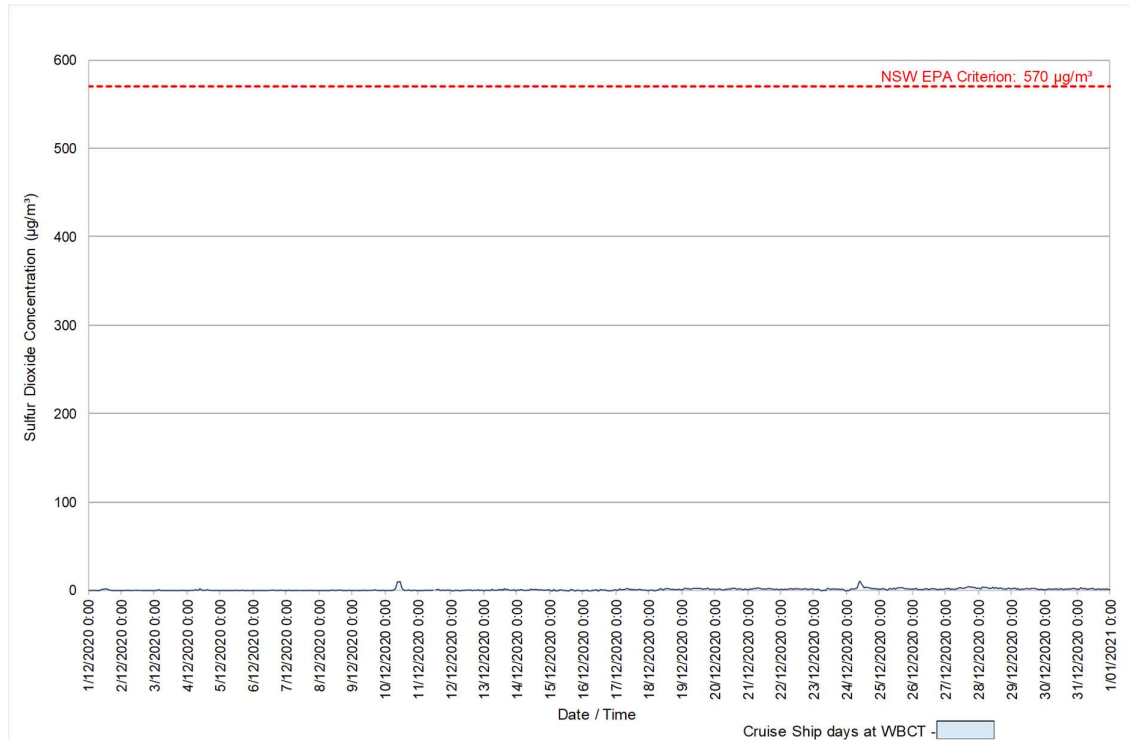


Note: Blue shading indicates cruise ship days, not arrival and departure times. Arrival and departure times are provided in Table 2.1.

Figure 2-1: 10-minute average SO<sub>2</sub> concentrations

### 2.3 1-hour Average Sulfur Dioxide Concentrations

A time series plot of the 1-hour average SO<sub>2</sub> concentration for December is shown in Figure 2-2. No exceedances of the 1-hour SO<sub>2</sub> criterion were recorded during the reporting period. The highest 1-hour average SO<sub>2</sub> concentration (10 µg/m<sup>3</sup>) was recorded on 24 December at 10 am. This concentration is approximately 2% 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<sub>2</sub> concentrations**

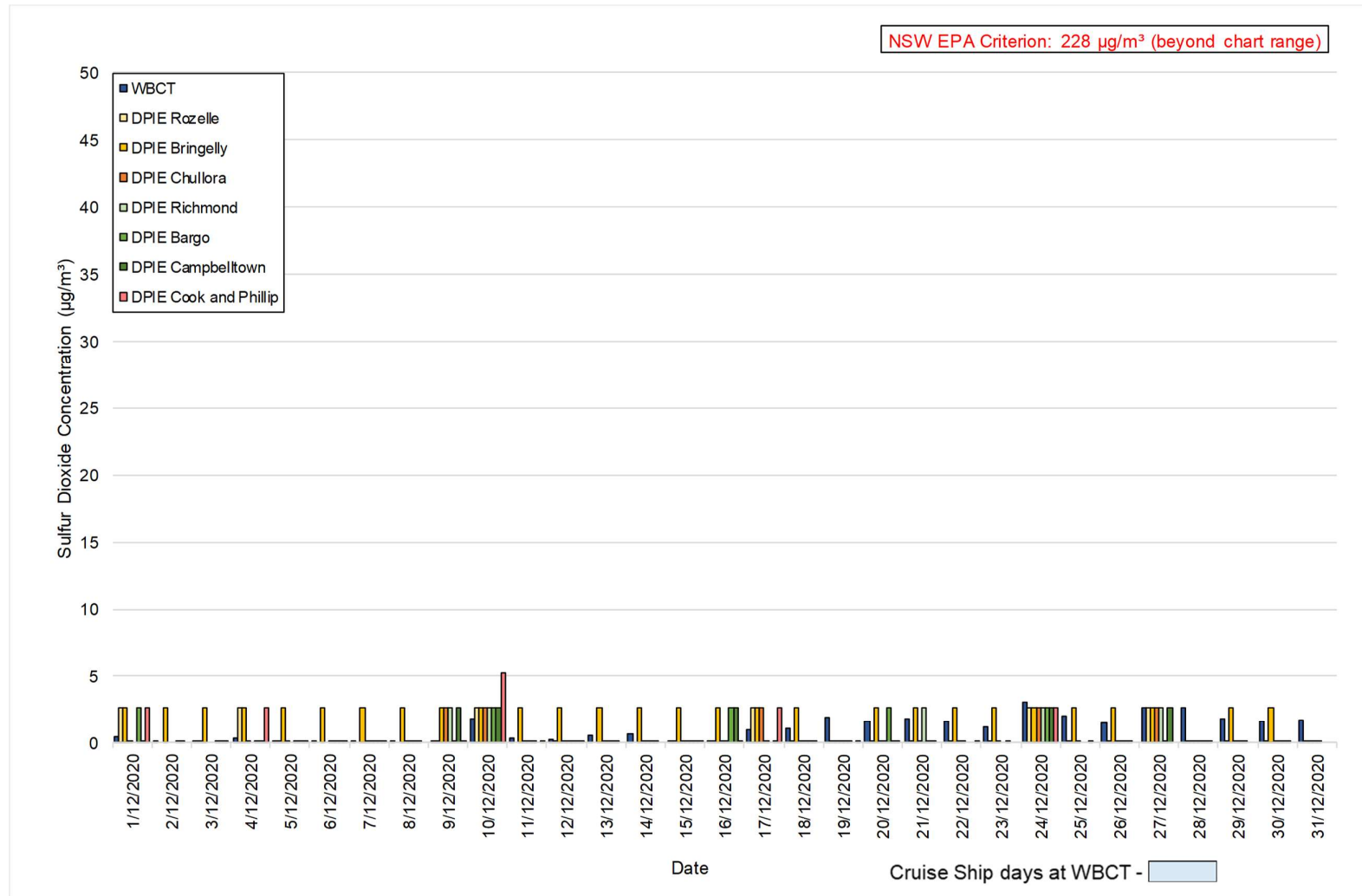
### 2.4 24-hour Average Sulfur Dioxide Concentrations

Time-series plots of 24-hour average SO<sub>2</sub> 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<sub>2</sub> include Rozelle, Bringelly, Chullora, Richmond, Bargo, Campbelltown and Cook and Phillip Park (Sydney CBD). 24-hour average SO<sub>2</sub> 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<sub>2</sub> concentration (3 µg/m<sup>3</sup>) was recorded on 24 December.



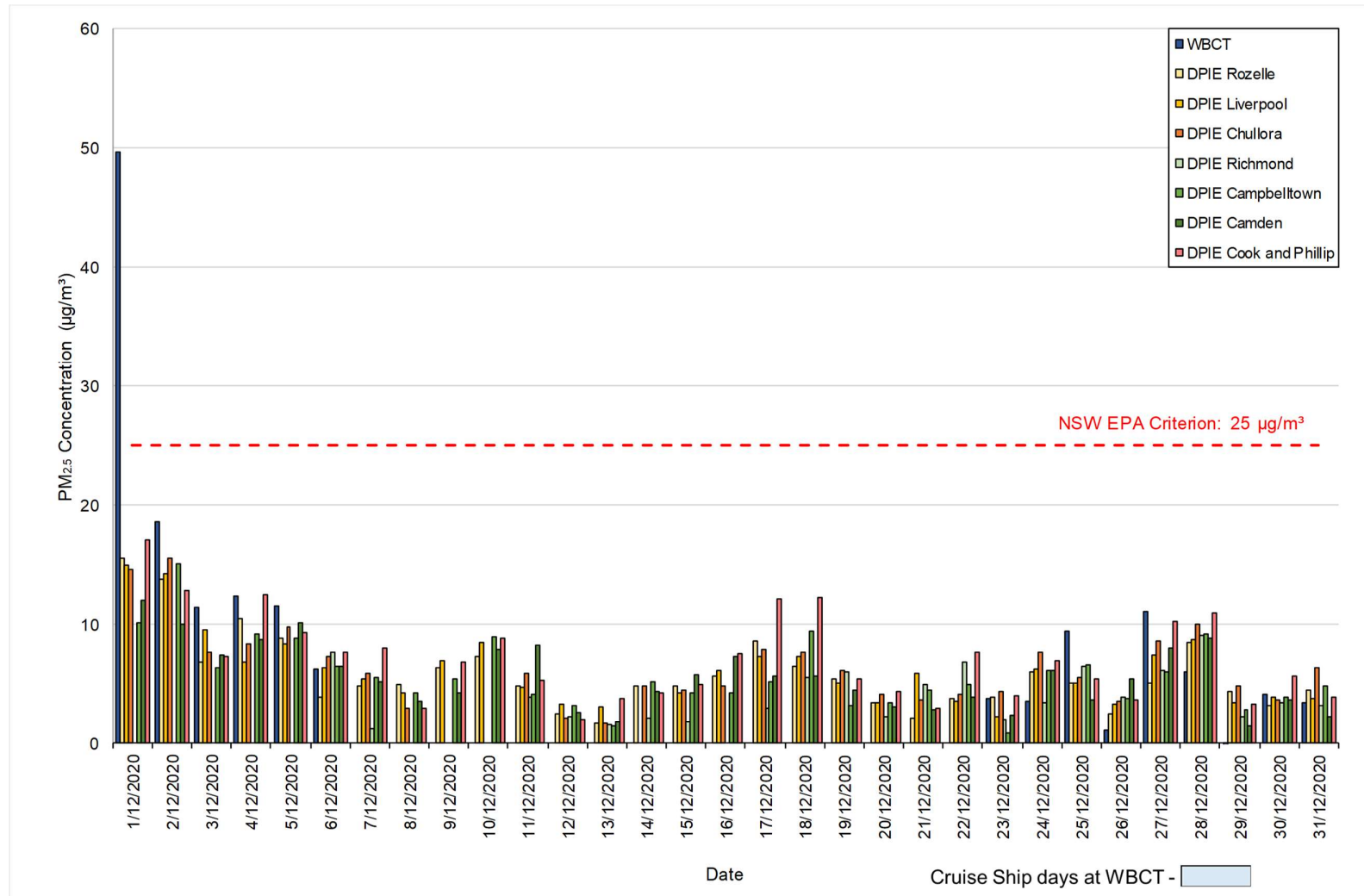


Note: Blue shading indicates cruise ship days, not arrival and departure times. Arrival and departure times are provided in Table 2.1. Zero data are graphed with a minor accentuation for visual purposes.

**Figure 2-3: 24-hour average SO<sub>2</sub> concentrations at WBCT and DPIP monitoring sites**

## 2.5 24-hour Average PM<sub>2.5</sub> Concentrations

Time-series plots of 24-hour average PM<sub>2.5</sub> concentrations at WBCT and selected DPIE monitoring sites are shown in Figure 2-4. Of the DPIE sites in Sydney, PM<sub>2.5</sub> is measured at a range of locations, including Rozelle, Liverpool, Chullora, Richmond, Campbelltown, Camden and Cook and Phillip.



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<sub>2.5</sub> concentration at WBCT and DPIE monitoring sites**

PM<sub>2.5</sub> measurements were invalidated between the 7<sup>th</sup> and 18<sup>th</sup> of December due to an instrumentation issue. PM<sub>2.5</sub> measurements were not collected between the 18<sup>th</sup> and 22<sup>nd</sup> December due to the completion of a repeated background (zero) test on the instrument.

There was a recorded exceedance of the NSW EPA 24-hour PM<sub>2.5</sub> criterion (25 µg/m<sup>3</sup>) at WBCT in the month of December, on the 1<sup>st</sup> (50 µg/m<sup>3</sup>). The cause of this exceedance is not clear. In the absence of WBCT shipping operations, this monitoring result has not been investigated further.

## 2.6 Summary Statistics

Summary statistics for the SO<sub>2</sub> and PM<sub>2.5</sub> concentrations at WBCT are shown in Table 2-1.

**Table 2-1: Summary statistics for SO<sub>2</sub> and PM<sub>2.5</sub> concentrations at WBCT (µg/m<sup>3</sup>)**

Pollutant:	SO <sub>2</sub>			PM <sub>2.5</sub>
Averaging period:	10 minute	1 hour	24 hour	24 hour
Criterion:	712	570	228	25
Mean	1	1	1	10
Median	1	1	1	6
Standard deviation	1	1	1	12
Sample variance	2	2	1	136
Range	17	11	3	50
Minimum	-2	-1	0	-1
Maximum	15	10	3	50
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.

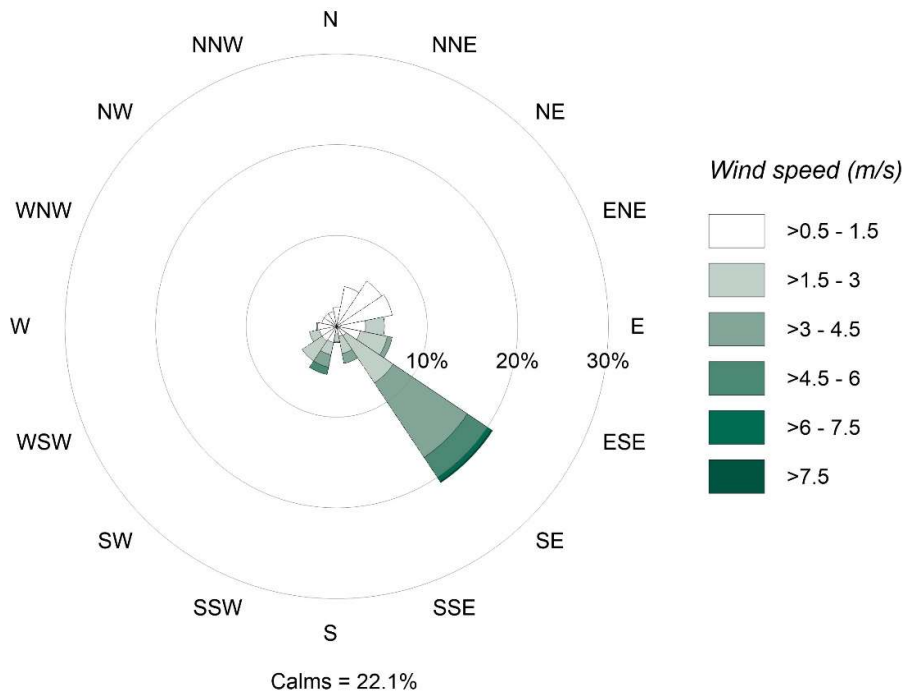


Figure 3-1: Wind rose for the reporting period

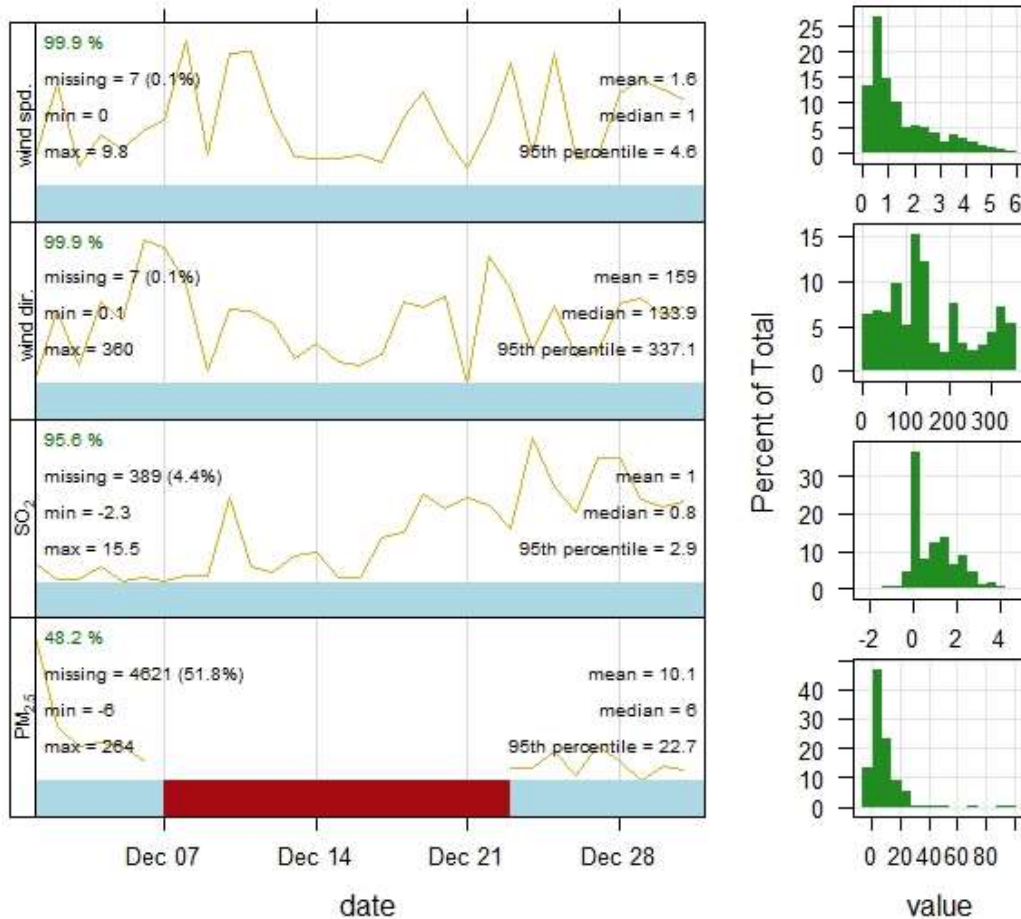
## 4. DATA AVAILABILITY

Data availability for SO<sub>2</sub> and PM<sub>2.5</sub> 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<sub>2</sub> (µg/m<sup>3</sup>) and PM<sub>2.5</sub> (µg/m<sup>3</sup>) 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<sub>2</sub> and PM<sub>2.5</sub>**

Statistic	SO <sub>2</sub> (5-minute)	PM <sub>2.5</sub> (1-hour)
Possible values	8,556	744
Missing values	389	385
Availability (%)	96	48
95 <sup>th</sup> percentile (µg/m <sup>3</sup> )	2.9	22.7

PM<sub>2.5</sub> measurements were invalidated between the 7<sup>th</sup> and 18<sup>th</sup> of December due to an instrumentation issue. PM<sub>2.5</sub> measurements were not collected between the 18<sup>th</sup> and 22<sup>nd</sup> December due to the completion of a repeated background (zero) test on the instrument.



**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.