



LAKE MACQUARIE – WYONG
REVIEW OF ANNUAL
AMBIENT AIR QUALITY
DATA 2015

NSW Environment Protection Authority

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Prepared by

Todoroski Air Sciences Pty Ltd

Suite 2B, 14 Glen Street

Eastwood, NSW 2122

Phone: (02) 9874 2123

Fax: (02) 9874 2125

Email: info@airsciences.com.au

Lake Macquarie – Wyong

Review of Annual Ambient Air Quality Data 2015

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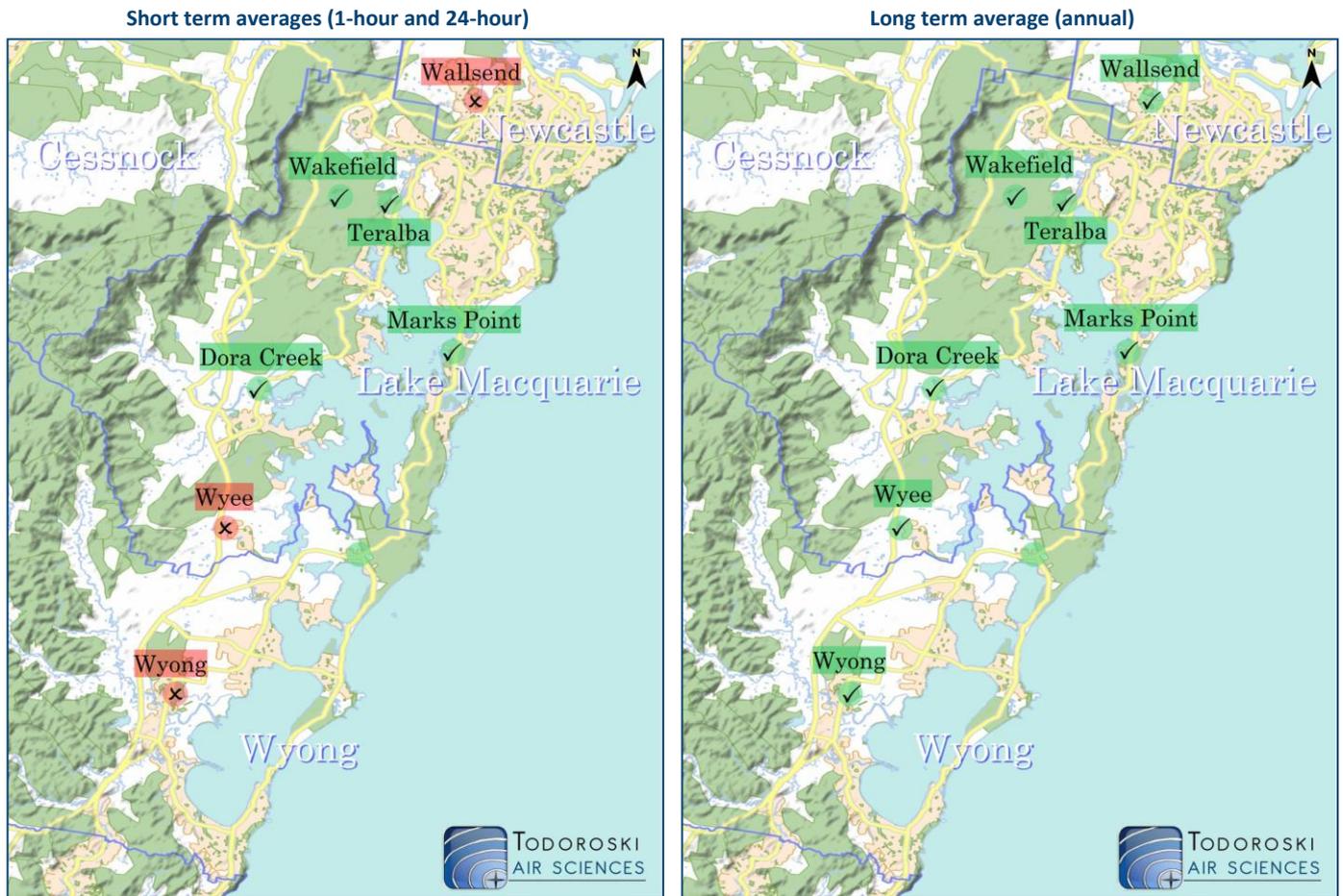
Appendix A – How to read a windrose
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EXECUTIVE SUMMARY

This report has been prepared by Todoroski Air Sciences for the NSW Environment Protection Authority (NSW EPA). It presents ambient air quality monitoring data recorded in the Lake Macquarie - Wyong region for the 2015 calendar year.

The results indicate that the air quality was generally good in the Lake Macquarie - Wyong region during 2015. The data summary (shown below) indicates that the Wallsend and Wyong monitoring sites recorded one day with 24-hour average PM₁₀ levels above the criterion of 50µg/m³ on 6 May 2015, during a widespread dust storm across NSW. The Wyee monitoring site recorded one day with a 24-hour average PM_{2.5} level above the advisory reporting standard of 25µg/m³ on 13 September 2015. All other data were below the applicable criteria. Further details are provided in the report. The 24-hour average data are provided in the Appendices.

Lake Macquarie - Wyong Air Quality Pictorial Summary – 2015



Lake Macquarie – Wyong Air Quality Tabular Summary - 2015

Site	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	SO ₂	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	
	Maximum 1-hour average (µg/m ³)		Maximum 24-hour average (µg/m ³)		Annual average (µg/m ³)					
	Air Quality Impact Criteria									
	570	246	50	25*	228	30	8*	60	62	
Wallsend	✓	✓	✗	✓	✓	✓	✓	✓	✓	
Wyong	✓	✓	✗	✓	✓	✓	✓	✓	✓	
Dora Creek	✓	✓	-	-	✓	-	-	✓	✓	
Marks Point	✓	✓	-	-	✓	-	-	✓	✓	
Wyee	✓	✓	-	✗	✓	-	✓	✓	✓	
Wakefield HVAS	-	-	✓	-	-	✓	-	-	-	
Teralba HVAS	-	-	✓	-	-	-	-	-	-	

✓ - All data below applicable criteria

✗ - At least one elevated level above applicable criteria

- - Not applicable

HVAS - High Volume Air Sampler

* - Advisory reporting standard for PM_{2.5} concentrations (refer to Section 5.1)

1 INTRODUCTION

This report has been prepared by Todoroski Air Sciences on behalf of the NSW EPA. It provides a summary and analysis of the available ambient air quality and meteorological data collected in the Lake Macquarie - Wyong region during the 2015 calendar year.

2 PROJECT SCOPE

The following outlines the scope of work for this project.

- ✦ Provide two annual summary reports for calendar years 2014 and 2015 for Lake Macquarie – Wyong. The reports will examine compliance with annual average criteria and summarise all of the monthly reported data for the calendar year and include seasonal trends and pollution rose analysis to identify likely source categories for elevated pollution events.
- ✦ The report will be published on the NSW EPA's website and will assess the available data from monitoring stations operated by the NSW Office of Environment and Heritage (OEH) at Wyong and Wallsend, and by industry at Wyee, Marks Point, Dora Creek, Wakefield and Teralba.
- ✦ The aim is to provide a simplified report that is accessible and contains results that would be clearly understood by the general public.

3 THE PURPOSE OF AMBIENT MONITORING

It is important to note that the data presented in this report are from both NSW EPA and industry monitoring sites. The NSW EPA and the industry monitoring sites collect data for different purposes and this needs to be understood when comparing the data to the criteria.

NSW EPA monitoring sites are specifically designed to measure the likely levels of pollutants that the general population in the area would experience (i.e. an underlying population exposure level), whereas industry monitoring sites are specifically designed to measure maximum levels in a particular location which may be affected by a particular industry.

Data from NSW EPA monitoring sites can be compared with national air quality standards. Where the levels measured at NSW EPA monitoring sites are above the national standards on a prolonged and consistent basis, this indicates that some investigation of the potential cause of the issue may be warranted to determine whether any action on a regional level would reduce or better manage the pollutant levels. In the case of PM₁₀, it is noted that the national standards permit five days annually above the criteria to allow for events such as bushfires and dust storms.

Data from industry monitoring sites can be compared with NSW EPA impact assessment criteria. Where the levels measured at industry monitoring sites are above the applicable impact assessment criteria on a prolonged and consistent basis, this indicates that further investigation is warranted to determine the potential cause and what action is required by industry to reduce or better manage the pollutant.

Whether there is any harmful effect on an individual due to an air pollutant will depend on many additional factors, and not just on the measured level of a pollutant. These factors include the total exposure to the pollutant, individual circumstances (age, health, body mass, levels of pollutants at work), levels of other pollutants in the area, and many other factors. Where pollutant levels are below the

criteria generally, harm would not be expected to occur, but it does not follow that harm automatically occurs when pollutant levels are above the criteria.

The criteria serve to highlight potential issues with the levels of pollutants that may warrant more detailed examination. The criteria may also serve to prioritise action in various areas, for example areas with the highest pollutant levels and highest populations or highest exposure would be expected to receive priority action.

3.1 More about air quality

More information about air quality can be found via the following links:

- + The Air Quality Index (AQI) was developed by the NSW EPA as an easily understood means of rating the pollutant level relative to its pollutant criteria.
 - o <http://www.environment.nsw.gov.au/AQMS/aboutaqi.htm>
- + Aqicn.org provides near real-time AQI values for monitoring locations around the world. It should be noted that the AQI presented on this website is calculated differently to the NSW EPA AQI and is less stringent than those used in Australia, thus a direct comparison may not be valid.
 - o <http://aqicn.org/map/world/>
- + The NSW OEH website air quality page provides hourly updates of the AQI and data readings from the NSW EPA monitoring sites, and can provide daily forecasts for Sydney and alerts for elevated levels at Wallsend and Wyong, for example. The web tool also presents near real-time wind and pollutant data readings overlaid on regional maps for the Upper Hunter and Newcastle.
 - o <http://www.environment.nsw.gov.au/aqms/aqi.htm>
- + The Lower Hunter Particle Characterisation Study aims to determine the composition of particulate samples collected at monitoring sites at Beresfield, Newcastle, Stockton and Mayfield, and to identify the potential major sources of fine particulates in Newcastle and the Lower Hunter. Progress reports are published on the OEH website provided below.
 - o <http://www.environment.nsw.gov.au/aqms/lowhunterparticle.htm>
- + The Air Emissions in My Community web tool presents the estimated emission quantities of various substances and their sources by postcode (and larger) sized areas in an easy to use graphical interface. This is one of the best inventories of emissions that is available, but it is important to appreciate that it cannot include all sources of emissions. It is important to also understand that pollutant emissions are not the same as the pollutant levels that this report presents. Emissions in a given area are one of several important factors that affect pollutant levels in an area, for example the dispersion of the emissions in the atmosphere and how the emissions are released are critical in determining the air quality pollutant levels.
 - o <http://www.epa.nsw.gov.au/air/airemissionsapp/airemissionswebtool.aspx>
- + The NSW Health website provides information on how air pollution affects health and steps for reducing your air pollution and limiting your exposure.
 - o <http://www.health.nsw.gov.au/environment/air/Pages/default.aspx>

4 AIR QUALITY MONITORING SITES

Figure 4-1 and **Table 4-1** summarise the locations and recorded parameters of the monitoring sites in the Lake Macquarie - Wyong region in 2015.

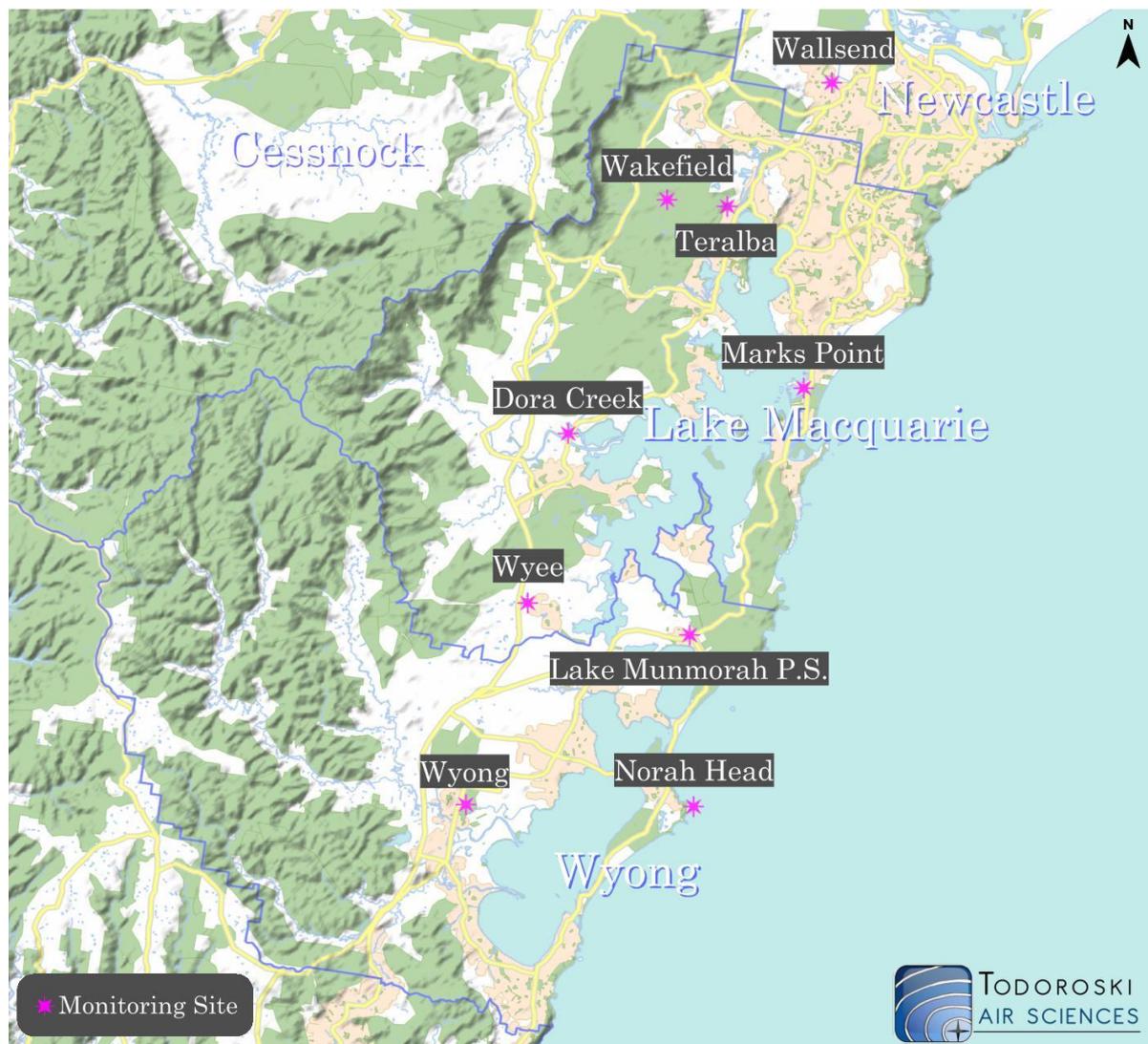


Figure 4-1: Monitoring site locations

Table 4-1: Monitoring sites

Monitoring Station	Type	Recorded Parameters	Recording Periods
Wallsend	NSW EPA site	PM ₁₀ (TEOM), PM _{2.5} , NO ₂ , SO ₂ , WS, WD	Hourly/Daily
Wyong	NSW EPA site	PM ₁₀ (TEOM), PM _{2.5} , NO ₂ , SO ₂ , WS, WD	Hourly/Daily
Marks Point	Industry site	NO ₂ , SO ₂ , WS, WD	Hourly
Wyee	Industry site	PM _{2.5} , NO ₂ , SO ₂ , WS, WD	Hourly
Lake Munmorah P.S.	Industry site	NO ₂ , SO ₂	Hourly
Dora Creek	Industry site	NO ₂ , SO ₂ , WS, WD	Hourly
Norah Head	BOM weather station	WS, WD	Hourly
Wakefield HVAS	Industry site	PM ₁₀ (HVAS)	Every 6th Day
Teralba HVAS	Industry site	PM ₁₀ (HVAS)	Every 6th Day

PM₁₀ - Particulate matter < 10µm

PM_{2.5} - Particulate matter < 2.5µm

TEOM - Tapered Element Oscillating Microbalance
(which samples air continuously)

NO₂ - Nitrogen dioxide

SO₂ - Sulfur dioxide

HVAS - High volume air sampler (which samples
for a 24-hour period every 6 days)

WS - Wind speed

WD - Wind direction

BOM - Bureau of
Meteorology

5 AIR QUALITY CRITERIA

The sections below identify the key pollutants currently being monitored at the Lake Macquarie - Wyong air quality monitoring sites and the applicable air quality criteria.

5.1 Particulate matter

Particulate matter consists of particles of varying size and composition. The total mass of all particles suspended in air is defined as the Total Suspended Particulate matter (TSP). The upper size range for TSP is nominally taken to be 30 micrometres (μm) as in practice particles larger than 30 to 50 μm will settle out of the atmosphere too quickly to be regarded as air pollutants.

The TSP is defined further into two sub-components. They are PM_{10} particles, particulate matter with aerodynamic diameters of 10 μm or less, and $\text{PM}_{2.5}$, particulate matter with aerodynamic diameters of 2.5 μm or less.

Table 5-1 summarises the air quality goals that are relevant to particulate pollutants as outlined in the NSW EPA document *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW DEC, 2005)*.

Table 5-1: NSW EPA air quality impact assessment criteria

Pollutant	Averaging Period	Criterion
Total suspended particulates (TSP)	Annual	90 $\mu\text{g}/\text{m}^3$
Particulate Matter < 10 μm (PM_{10})	Annual	30 $\mu\text{g}/\text{m}^3$
	24-hour	50 $\mu\text{g}/\text{m}^3$

Source: NSW DEC, 2005

5.2 $\text{PM}_{2.5}$ concentrations

The NSW EPA currently do not have impact assessment criteria for $\text{PM}_{2.5}$ concentrations, however the National Environment Protection Council (NEPC) has released a variation to the National Environment Protection Measure (NEPM) (NEPC, 2003) to include advisory reporting standards for $\text{PM}_{2.5}$ (see **Table 5-2**). As with the NEPM goals, the advisory reporting standards apply to the average, or general exposure of a population, rather than to "hot spot" locations such as industry monitoring sites.

Table 5-2: Advisory standard for $\text{PM}_{2.5}$ concentrations

Pollutant	Averaging Period	Concentration
Particulate Matter < 2.5 μm ($\text{PM}_{2.5}$)	24-hour	25 $\mu\text{g}/\text{m}^3$
	Annual	8 $\mu\text{g}/\text{m}^3$

Source: NEPC, 2003

5.3 Other air pollutants

Nitrogen dioxide (NO_2) is reddish-brown in colour (at high concentrations) with a characteristic odour and can irritate the lungs and lower resistance to respiratory infections such as influenza. NO_2 belongs to a family of reactive gases called nitrogen oxides (NO_x). These gases form when fuel is burned at high temperatures, and mainly originate from motor vehicles, power generators and industrial boilers (USEPA, 2013). NO_x may also be generated by blasting activities. It is important to note that when formed, NO_2 is generally a small fraction of the total NO_x generated.

Sulfur dioxide (SO₂) is a colourless, toxic gas with a pungent and irritating smell. It commonly arises in industrial emissions due to the sulfur content of the fuel. SO₂ can have impacts upon human health and the habitability of the environment for flora and fauna. SO₂ emissions are a precursor to acid rain, which can be an issue in the northern hemisphere; however it is not known to be an issue in NSW.

Table 5-3 summarises the air quality goals for NO₂ and SO₂.

Table 5-3: Air quality impact assessment criteria for air pollutants

Pollutant	Averaging period	Criterion
Nitrogen Dioxide (NO ₂)	1-hour	246µg/m ³
	Annual	62µg/m ³
Sulfur Dioxide (SO ₂)	10-minute	712µg/m ³
	1-hour	570µg/m ³
	24-hour	228µg/m ³
	Annual	60µg/m ³

Source: **NSW DEC, 2005**

5.4 Summary of applicable criteria for this review

The particulate and gaseous pollutants monitored in the Lake Macquarie – Wyong region have air quality criteria which are averaged over short and long time periods.

As this report looks at an annual period of ambient air quality data, the annual average criteria are applicable along with those averaged over the shorter time periods (1-hour and 24-hours). The SO₂ 10-minute average criterion was not included as 10-minute monitoring data are not available.

Table 5-4 summarises the applicable air quality criteria for this review.

Table 5-4: Air quality criteria used in this review

Pollutant	Averaging Period	Type	Concentration
Particulate Matter < 10µm (PM ₁₀)	24-hour	Criterion	50µg/m ³
	Annual	Criterion	30µg/m ³
Particulate Matter < 2.5µm (PM _{2.5})	24-hour	Advisory Reporting Standard	25µg/m ³
	Annual	Advisory Reporting Standard	8µg/m ³
Nitrogen Dioxide (NO ₂)	1-hour	Criterion	246µg/m ³
	Annual	Criterion	62µg/m ³
Sulfur Dioxide (SO ₂)	1-hour	Criterion	570µg/m ³
	24-hour	Criterion	228µg/m ³
	Annual	Criterion	60µg/m ³

6 METEOROLOGICAL MONITORING DATA

Representative wind speed and direction data have been obtained from the Lake Macquarie - Wyong meteorological stations. The data are presented as a series windroses.

For an example of how to read a windrose, refer to **Figure A-1** in **Appendix A**.

Figure 6-1 presents the 2015 annual windroses for Wallsend, Dora Creek, Marks Point, Wyee, Norah Head and Wyong. Seasonal windroses for the meteorological stations are presented in **Figure 6-2** and **Figure 6-3**.

The annual windroses show that the meteorological stations recorded winds which varied depending on the local influence of environmental features such as terrain, vegetation and buildings.

During summer, the meteorological stations generally recorded winds which originated from the north-easterly and south-easterly quadrants. The recorded wind directions in spring were more varied, with low wind speeds from westerly directions common at Wyong, Wyee, Dora Creek and Wallsend.

The meteorological stations generally recorded low wind speeds which originated from the north-northwesterly to south-southwesterly directions during autumn and winter.

The Norah Head weather station recorded the majority of winds on a north to south axis with wind speeds which were generally higher than those recorded at the other stations. This is expected as the Norah Head weather station is located at an unsheltered coastal location that would be largely influenced by sea breezes.

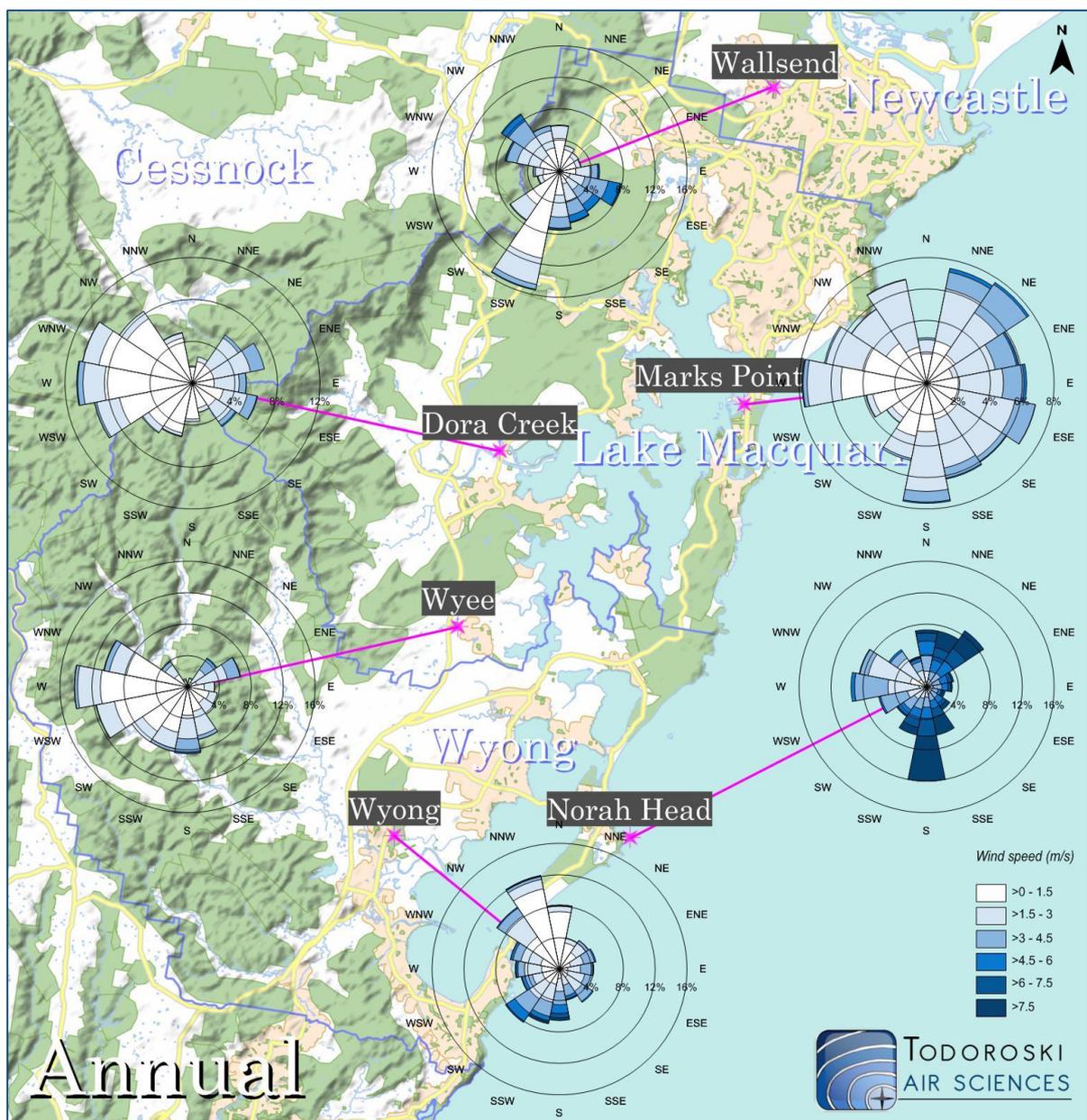


Figure 6-1: Annual 2015 windroses - Wallsend, Dora Creek, Marks Point, Wyong, Norah Head and Wyong

The annual windroses show that the meteorological stations recorded winds which varied depending on the local influence of environmental features such as terrain, vegetation and buildings.

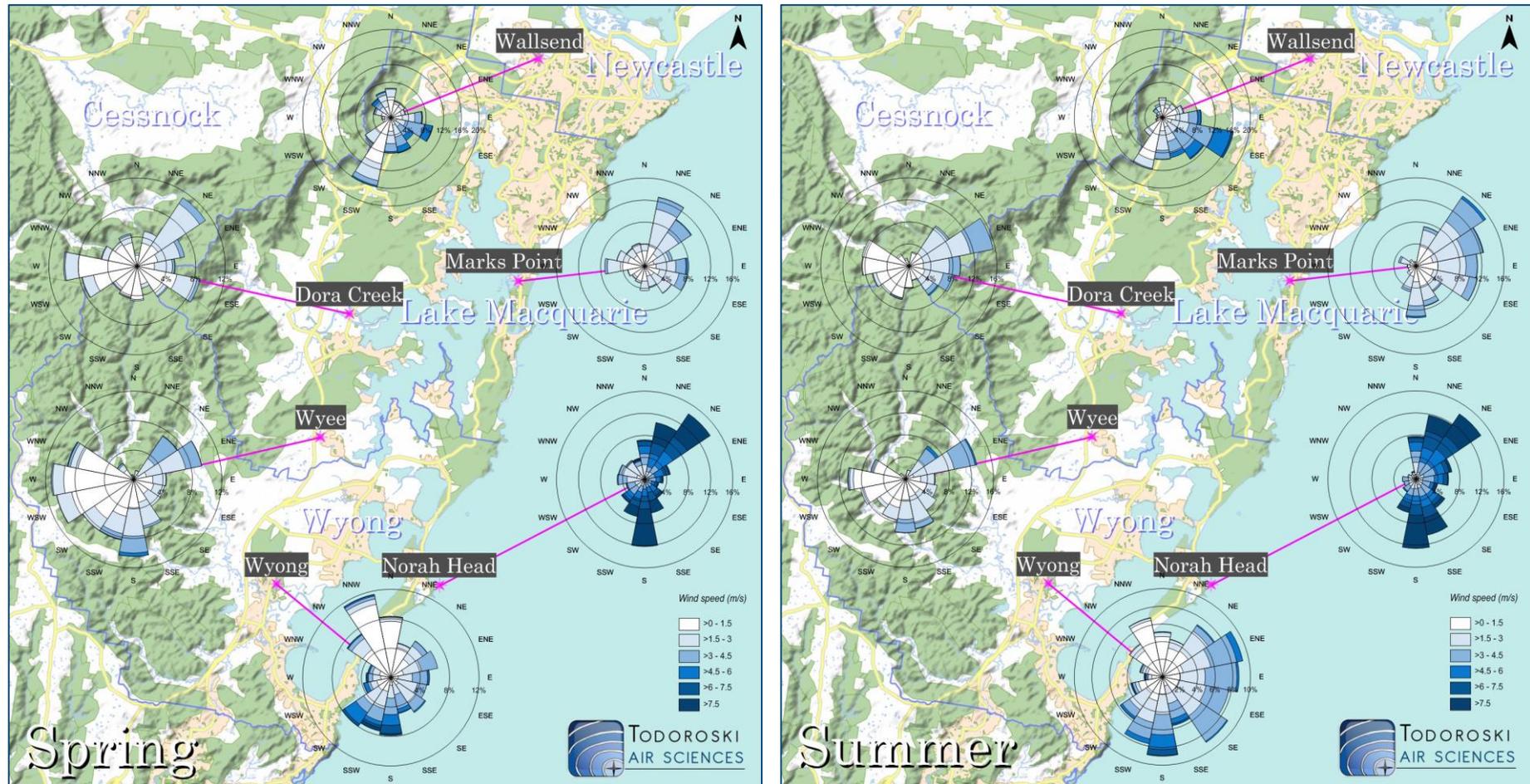


Figure 6-2: Wallsend, Dora Creek, Marks Point, Wye, Norah Head and Wyong windroses – Spring 2015 (left) and Summer 2015 (right)

During summer, the meteorological stations generally recorded winds which originated from the north-easterly and south-easterly quadrants. The recorded wind directions in spring were more varied, with low wind speeds from westerly directions common at Wyong, Wye, Dora Creek and Wallsend.

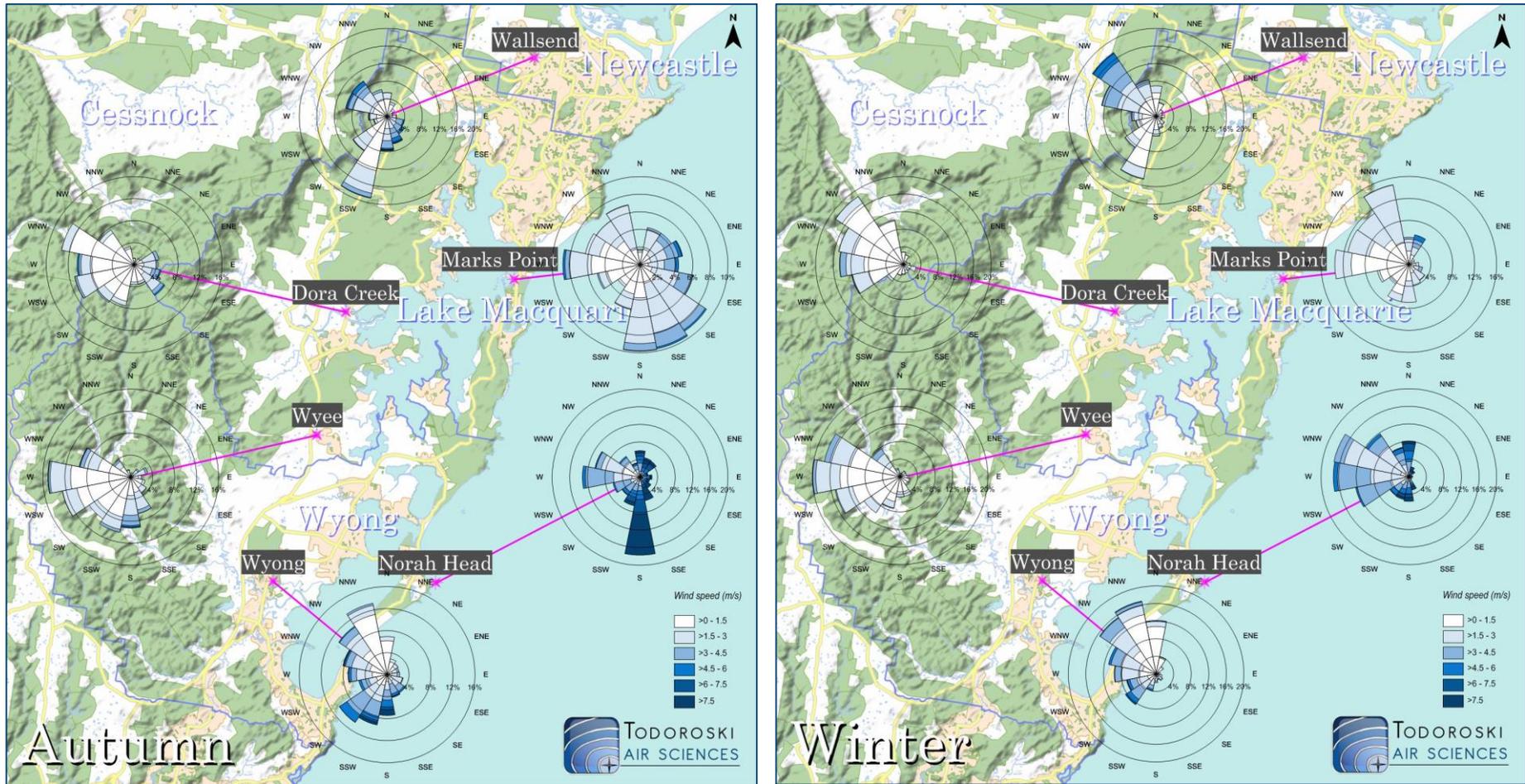


Figure 6-3: Wallsend, Dora Creek, Marks Point, Wyee, Norah Head and Wyong windroses – Autumn 2015 (left) and Winter 2015 (right)

The meteorological stations generally recorded low wind speeds which originated from the north-northwesterly to south-southwesterly directions during autumn and winter.

7 AMBIENT AIR QUALITY MONITORING DATA

7.1 Preamble

The monitoring data in this report are presented in raw form as provided to Todoroski Air Sciences by the NSW EPA.

The 24-hour average data presented in this report have been averaged using the 1-hour average readings. Days which contain less than 75% data (less than 18 hours of 1-hour average data) have not been included in this report.

The annual average data presented in this report have been averaged using the 1-hour average readings for SO₂ and NO₂, and 24-hour average readings for PM₁₀ and PM_{2.5}. Annual averages with less than 75% data in a calendar quarter have been indicated.

All of the monitoring data provided to Todoroski Air Sciences are presented in this report. The data are shown in the results and Appendices as relevant. 1 hour, 24-hour and annual average data are presented in a graphical format in **Appendix B** and 24-hour average data are presented in a tabulated format in **Appendix C**.

Hourly averaged pollutant monitoring data were combined with wind speed and direction data to provide an understanding of the conditions in which high pollutant levels most frequently occur. The data are presented as pollution roses in **Appendix B**. For an example pollution rose, refer to **Figure A-2** in **Appendix A**.

7.2 Analysis of Monitoring Data

Table 7-1 presents a summary of the pollutant levels measured during 2015. The results indicate that the Wallsend and Wyong monitors recorded 24-hour average PM₁₀ levels above the criterion of 50µg/m³ and the Wyee monitor recorded a 24-hour average PM_{2.5} level above the advisory reporting standard of 25µg/m³. All other pollutant levels were below the applicable criteria.

Table 7-1: Maximum and annual average pollutant levels - 2015

Site	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	SO ₂	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	
	Maximum 1-hour average (µg/m ³)		Maximum 24-hour average (µg/m ³)			Annual average (µg/m ³)				
	Air Quality Impact Criteria									
	570	246	50	25*	228	30	8*	60	62	
Wallsend	96.5	86.2	77.5	24.0	19.4	16.7	7.3	2.6	15.8	
Wyong	197.0	66.1	58.6	13.2	26.8	14.9	5.2	1.6	9.3	
Dora Creek	87.1	179.0	-	-	11.8	-	-	2.7	14.0	
Marks Point	83.0	80.3	-	-	11.6	-	-	4.0	8.6 ¹	
Wyee	178.2	70.1	-	26.3	35.2	-	7.1	4.0	11.7	
Wakefield HVAS	-	-	35.1	-	-	14.1	-	-	-	
Teralba HVAS	-	-	50.0	-	-	14.8	-	-	-	

* Advisory reporting standard for PM_{2.5} concentrations (refer to Section 5.1)

¹ 74% data capture in Q4 of 2015

- Not applicable

7.3 PM₁₀

Figure 7-1 presents all of the 24-hour average PM₁₀ monitoring results recorded in the Lake Macquarie - Wyong region in 2015.

Relative to the Air Quality Index, as shown by the coloured bands in the figure, PM₁₀ levels were generally very good or good at all monitors in 2015. The Wallsend, Wyong, Teralba and Wakefield monitors recorded fair levels on six, four, four and one days respectively. On 6 May 2015 the Wallsend and Wyong monitors recorded very poor and poor levels respectively.

The Wallsend and Wyong monitors recorded elevated PM₁₀ levels above the 24-hour average criterion of 50µg/m³ on 6 May 2015. All other 24-hour average data were below the criterion in 2015.

All annual average data recorded at the Lake Macquarie - Wyong monitoring sites were below the criterion of 30µg/m³ in 2015.

Figure B-1 to **Figure B-2** in **Appendix B** present the 1-hour average, 24-hour average and annual average PM₁₀ data in graphical form for each individual site. There is no criterion that applies to 1-hour average PM₁₀ levels and these 1-hour results are not intended to be compared with the PM₁₀ criterion. It is a normal occurrence, and it is expected that in the normal environment 1-hour average PM₁₀ levels will fluctuate more significantly than 24-hour average PM₁₀ levels.

Figure B-3 presents pollution roses of the PM₁₀ monitoring data collected by the Wallsend and Wyong monitoring sites in 2015.

7.4 PM_{2.5}

Figure 7-2 presents all of the 24-hour average PM_{2.5} monitoring data recorded in the Lake Macquarie - Wyong region in 2015.

Relative to the Air Quality Index, as shown by the coloured bands in the figure, the data indicate that PM_{2.5} levels were generally very good to good in 2015. The Wyee and Wallsend monitors recorded eleven and eight days with fair levels respectively.

On 13 September 2015 the Wyee monitor recorded a poor level which was above the 24-hour average PM_{2.5} advisory reporting standard of 25µg/m³. All other 24-hour average data recorded at the Lake Macquarie - Wyong monitoring sites were below the applicable PM_{2.5} advisory reporting standard in 2015.

All of the recorded annual average PM_{2.5} levels were below the annual average PM_{2.5} advisory reporting standard of 8µg/m³ in 2015.

Figure B-4 to Figure B-6 in Appendix B present the 1-hour average, 24-hour average and annual average PM_{2.5} data in graphical form for each individual site. There is no criterion that applies to 1-hour average PM_{2.5} levels and these 1-hour results are not intended to be compared with the PM_{2.5} advisory reporting standard. It is a normal occurrence, and it is expected that in the normal environment 1-hour average PM_{2.5} levels will fluctuate more significantly than 24-hour average PM_{2.5} levels.

We note the Wyee monitoring site, and to a lesser extent the Wallsend and Wyong sites, on occasion recorded periods in which PM_{2.5} levels were less than zero. In some situations the concentration of the pollutant being measured may be very close to zero, in which case the measured value (after adjusting for drift of zero and span and any other corrections) may be less than the measurement limit of detection (**NEPC, 2001**), and in these circumstances the output may be negative.

The monitors may also record short term positive or negative values due to instrument faults, the presence of moisture within the instrument or volatile matter (which can register as a solid mass at first, but then evaporates, registering negative mass at a later time).

Figure B-7 to Figure B-8 present pollution roses of the PM_{2.5} monitoring data collected by the Wallsend, Wyong and Wyee monitoring sites in 2015.

7.5 NO₂

Figure 7-3 presents the 1-hour average NO₂ monitoring data recorded in the Lake Macquarie - Wyong region in 2015.

Relative to the Air Quality Index, as shown by the coloured bands in the figure, the data indicate the measured levels of NO₂ were very good or good at all monitors at all times with the exception of the Dora Creek monitor which recorded two hours with fair levels.

All 1-hour average and annual average data were below the applicable criteria in 2015.

Figure B-9 to Figure B-11 present pollution roses of the NO₂ monitoring data collected by the monitoring sites in 2015.

7.6 SO₂

Figure 7-4 presents the 1-hour average SO₂ monitoring data recorded in the Lake Macquarie - Wyong region in 2015.

Relative to the Air Quality Index, as shown by the coloured bands in the figure, the data indicate the measured SO₂ levels were very good at all monitors at all times with the exception of the Wyong monitor which recorded one hour with good levels.

All 1-hour average and annual average data were below the applicable criteria in 2015.

Figure B-12 to **Figure B-14** present pollution roses of the SO₂ monitoring data collected by the monitoring sites in 2015.

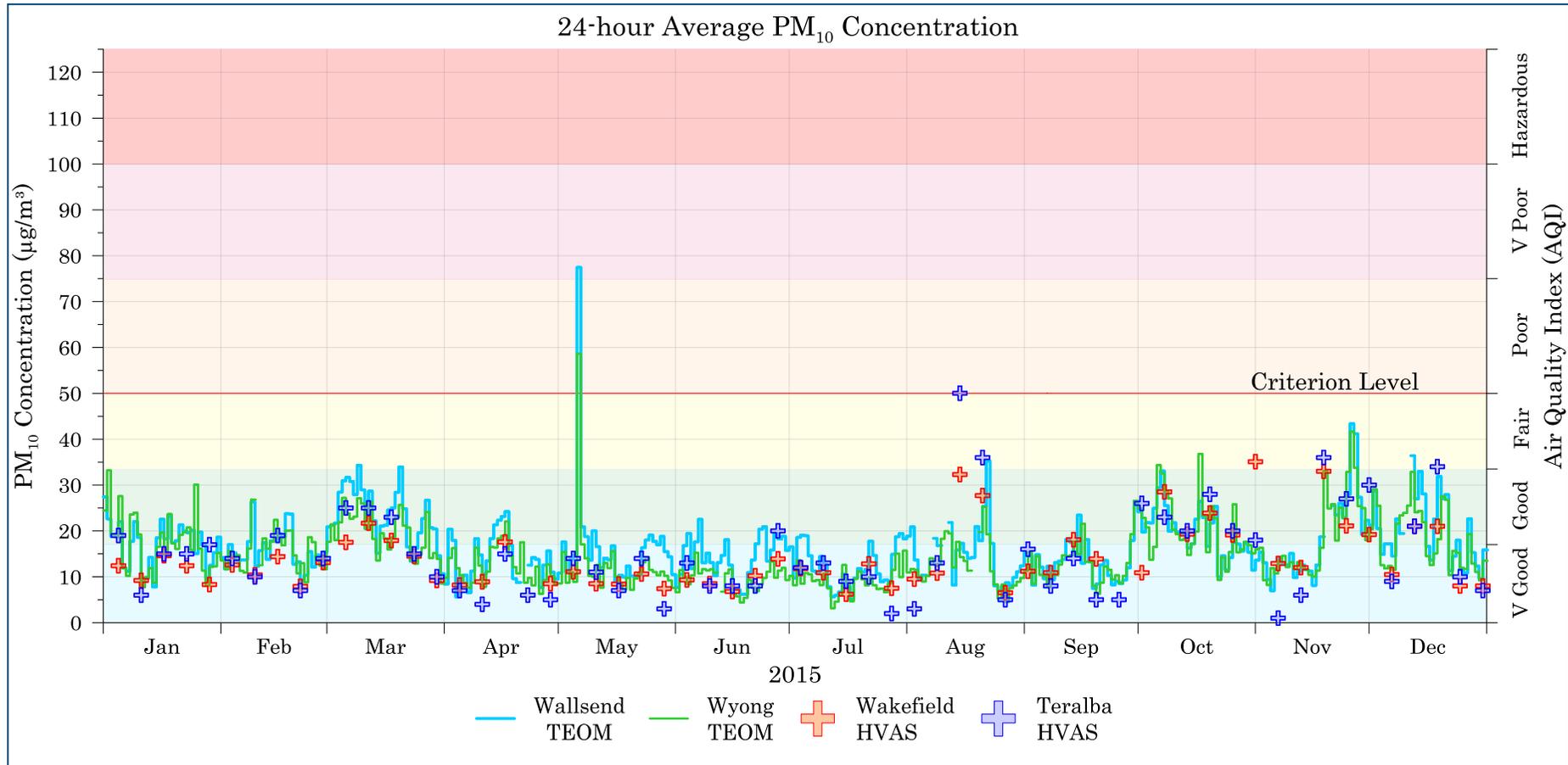


Figure 7-1: Lake Macquarie - Wyong 24-hour average PM₁₀ levels - 2015

The recorded PM₁₀ levels were generally good in 2015. The Wallsend, Wyong, Teralba and Wakefield monitors recorded fair levels on six, four, four and one days respectively. On 6 May 2015 the Wallsend and Wyong monitors recorded very poor and poor levels which were above the 24-hour average PM₁₀ criterion of 50µg/m³. All other data recorded at the Lake Macquarie - Wyong monitoring sites were below the 24-hour average PM₁₀ criterion of 50µg/m³.

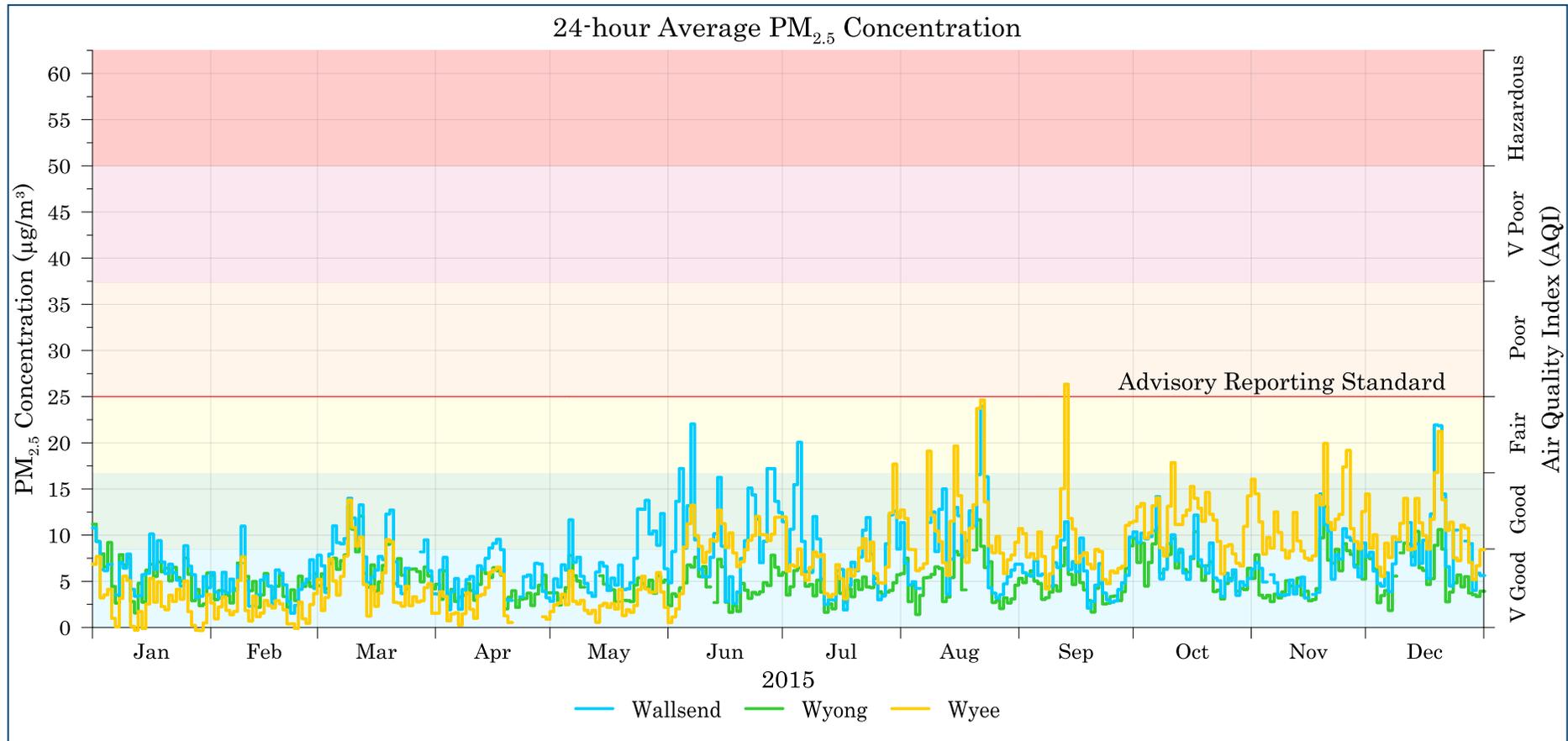


Figure 7-2: Lake Macquarie - Wyong 24-hour average PM_{2.5} levels – 2015

The recorded PM_{2.5} levels were generally very good to good in 2015. The Wye and Wallsend monitors recorded eleven and eight days with fair levels respectively. On 13 September 2015 the Wye monitor recorded a poor level which was above the 24-hour average PM_{2.5} advisory reporting standard of 25µg/m³. All other data recorded at the Lake Macquarie - Wyong monitoring sites were below the advisory reporting standard of 25µg/m³.

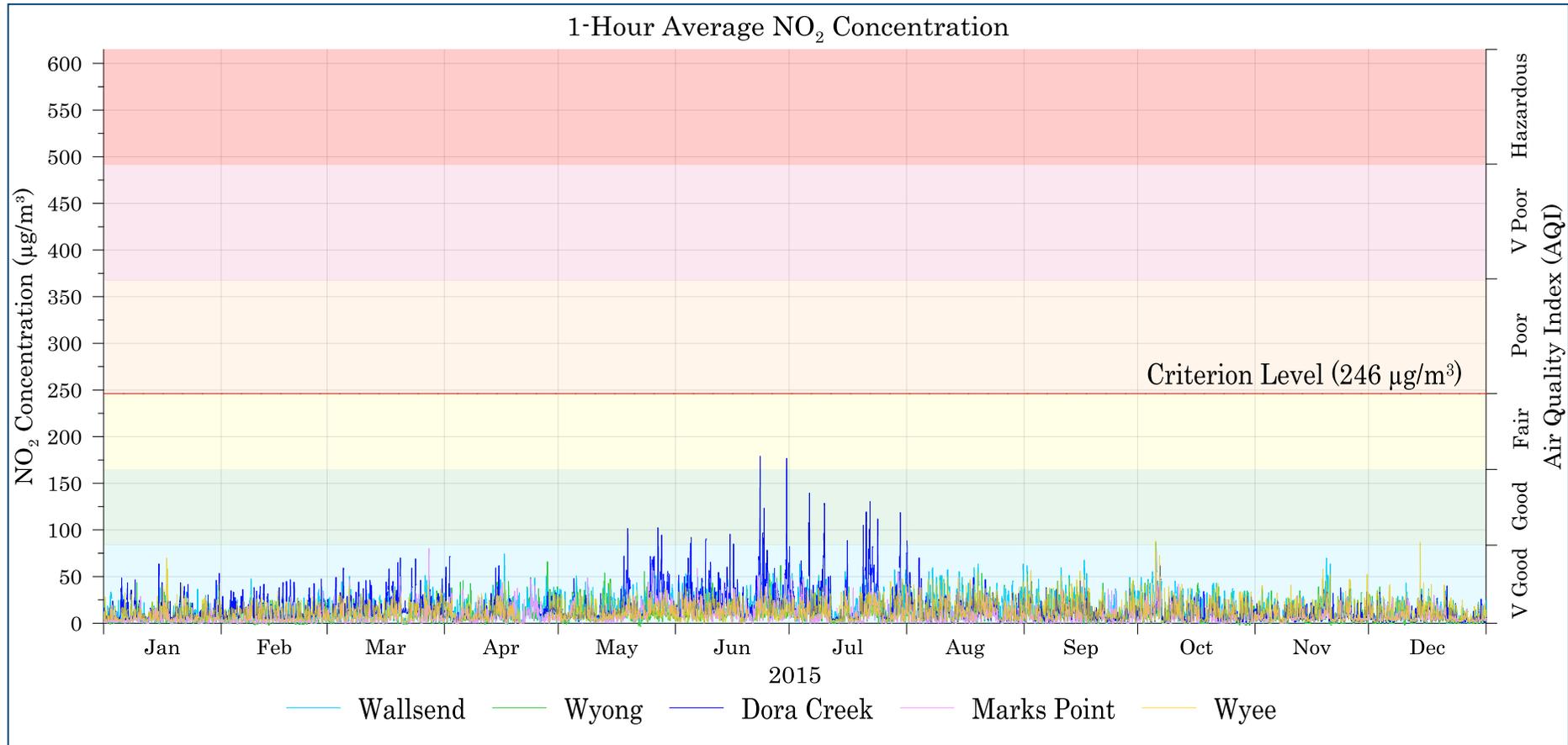


Figure 7-3: Lake Macquarie - Wyong 1-hour average NO₂ levels – 2015

All data recorded at the Lake Macquarie - Wyong monitoring sites were below the 1-hour average NO₂ criterion level of 246µg/m³ in 2015. Measured levels of NO₂ were very good or good at all monitors at all times with the exception of the Dora Creek monitor which recorded two hours with fair levels.

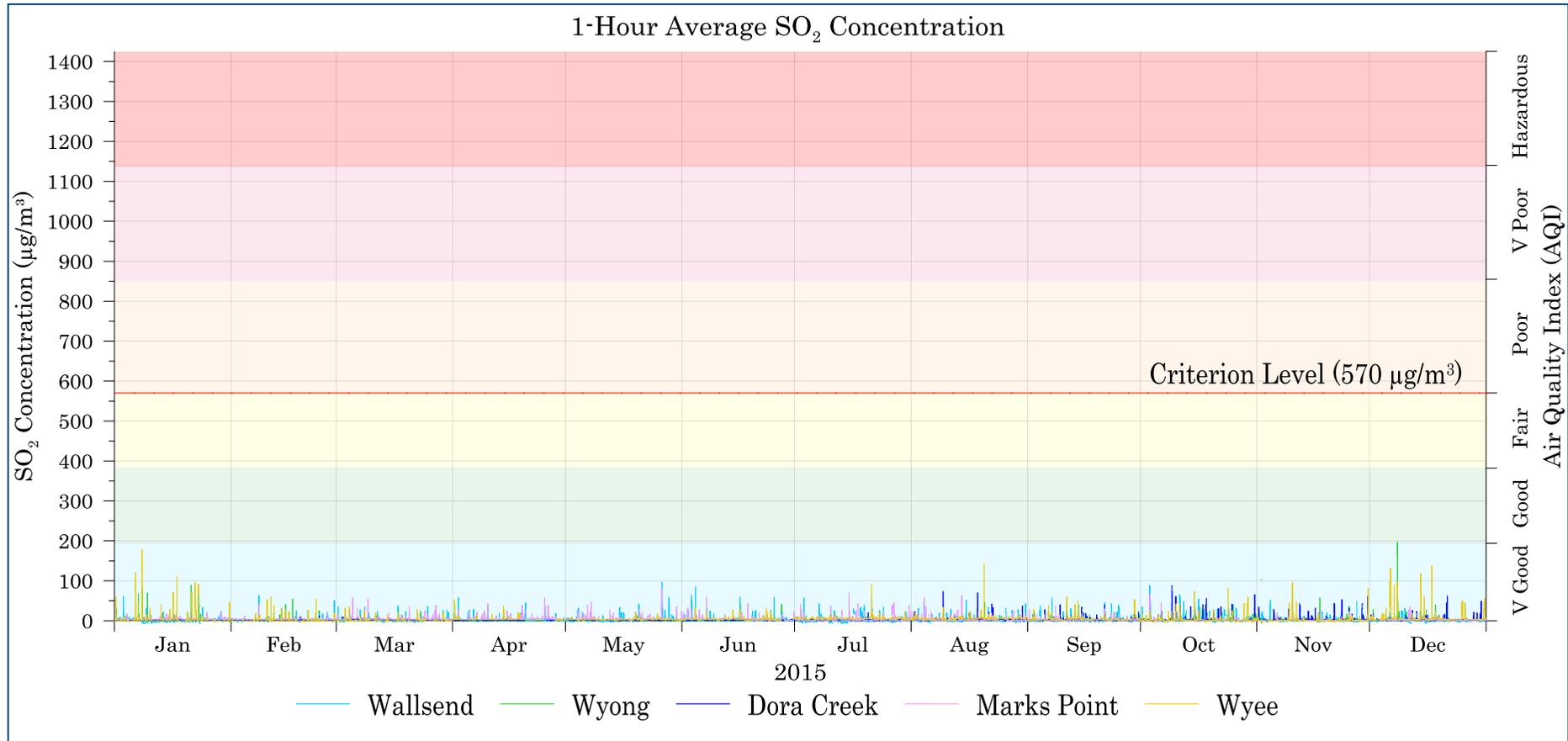


Figure 7-4: Lake Macquarie - Wyong 1-hour average SO₂ levels – 2015

All data recorded at the Lake Macquarie - Wyong monitoring sites were below the 1-hour average SO₂ criterion level of 570µg/m³ in 2015. Measured levels of SO₂ were very good at all monitors at all times with the exception of the Wyong monitor which recorded one hour with good levels.

8 ANALYSIS OF ELEVATED POLLUTANT LEVELS

There were three elevated levels above the applicable criteria in 2015, these included:

- ✦ 24-hour average PM₁₀ level of 77.5µg/m³ recorded at Wallsend on 6 May 2015;
- ✦ 24-hour average PM₁₀ level of 58.6µg/m³ recorded at Wyong on 6 May 2015; and,
- ✦ 24-hour average PM_{2.5} level of 26.3µg/m³ recorded at Wyee on 13 September 2015.

8.1 Wallsend and Wyong TEOM monitors - 6 May 2015

Figure 8-1 presents a plot of the 1-hour average PM₁₀, wind speed and wind direction data recorded at Wallsend on 6 May 2015. The 1-hour average PM₁₀ levels recorded at Wyong have also been included. The data presented in **Figure 8-1** show that the Wallsend monitor recorded elevated PM₁₀ levels during periods of low wind speeds from the west. The Wallsend and Wyong monitors recorded similar trends in PM₁₀ levels on 6 May, with elevated PM₁₀ levels from approximately 2am to 6pm.

Further investigation identified that on 6 May 2015, a wide area of NSW was affected by a large dust storm which originated in the Victorian Mallee and the southwest of NSW. A NSW OEH media release (**NSW OEH, 2015a**) on 6 May stated that this was a natural event which occurred at a time when cultivation was underway for winter crops. A cold front caused the dust to be whipped up and carried east and north.

A summary of all of the 24-hour average PM₁₀ data recorded at the NSW OEH air quality monitors located across NSW has been presented in **Table 8-1**. The results indicate that elevated PM₁₀ levels were widespread across NSW on 6 May. It is very likely that elevated PM₁₀ levels recorded at Wallsend and Wyong on 6 May were caused by the dust storm which impacted a large area of NSW.

Table 8-1: NSW EPA PM₁₀ air quality monitoring data for 5 and 6 May 2015

Region	Monitor	5/05/15	6/05/15	Region	Monitor	5/05/15	6/05/15
Sydney central-east	Randwick	24.9	77.4	Central coast	Wyong	8.9	58.6
	Rozelle	19.5	60.3	Lower Hunter/ Newcastle Region	Wallsend	14.9	77.5
	Lindfield	16	56.4		Carrington	17.9	80.6
	Liverpool	33.6	68.6		Stockton	33.1	96.9
	Chullora	23.2	64.6		Newcastle	15.1	70.4
	Earlwood	23.6	66.5		Mayfield	13.8	84.7
Sydney north-west	Richmond	18	49.3		Beresfield	12.1	64.9
	St Marys	22.2	53	Muswellbrook	10.7	72.6	
	Vineyard	16.5	59	Singleton	17.2	85.3	
	Prospect	23.5	68.7	Maison Dieu	16.4	77.3	
Sydney south-west	Bargo	38.6	52.2	Camberwell	18.7	86.7	
	Bringelly	26.9	57	Singleton Northwest	21.3	84	
	Campbelltown	33.5	69.7	Mount Thorley	15.2	85.2	
	Camden	29.3	62.4	Bulga	10.1	60.6	
	Oakdale	34.5	61.7	Muswellbrook Northwest	10.4	72.9	
Illawarra	Wollongong	33.6	45.8	Wybong	8.3	79.5	
	Kembla Grange	38.7	47.4	Aberdeen	8.5	64.8	
	Albion Park South	38.6	37.8	Singleton South	15.1	82.5	
North-west slopes	Tamworth	13.4	52.7	Jerrys Plains	7.6	70	
Central tablelands	Bathurst	40.9	94.6	Warkworth	10	68.2	
South-west slopes	Albury	92.5	24.5	Merriwa	7.2	83	
	Wagga Wagga North	145.1	74.3				

Source: **NSW OEH, 2015b**

8.2 Wyee – 13 September 2015

Figure 8-2 presents a plot of the 1-hour average PM_{2.5}, wind speed and wind direction data recorded at the Wyee monitoring site on 12 and 13 September 2015. The 1-hour average PM_{2.5} levels recorded at Wallsend and Wyong have also been included.

The data presented in **Figure 8-2** show that the Wyee monitor recorded elevated PM_{2.5} levels from 6:00pm on 12 September until 7:00am on 13 September, during calm wind conditions. The other monitors did not record elevated levels during these conditions.

Given the calm wind conditions and low levels at Wallsend and Wyong, it is likely the elevated PM_{2.5} levels at Wyee originated from a local source (such as a household wood heater or other combustion sources) nearby to the monitor.

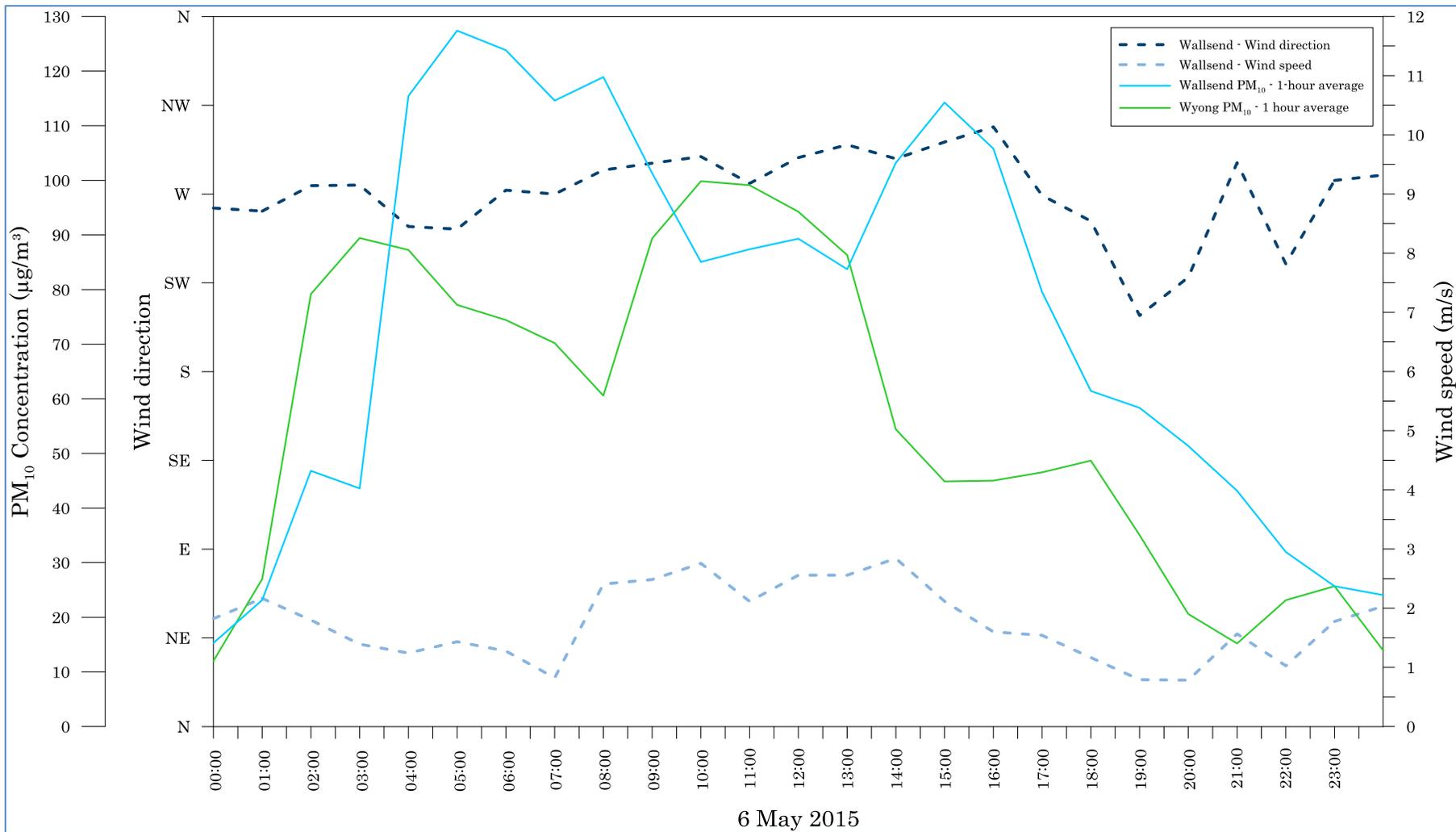


Figure 8-1: Analysis of elevated PM₁₀ levels on 6 May 2015 - Wallsend and Wyong

The Wallsend monitor recorded elevated PM₁₀ levels during periods of relatively low wind speeds from the west. The Wallsend and Wyong monitors recorded similar trends in PM₁₀ levels on 6 May, with elevated PM₁₀ levels from approximately 2am to 6pm. This indicates that the dust originated from the west.

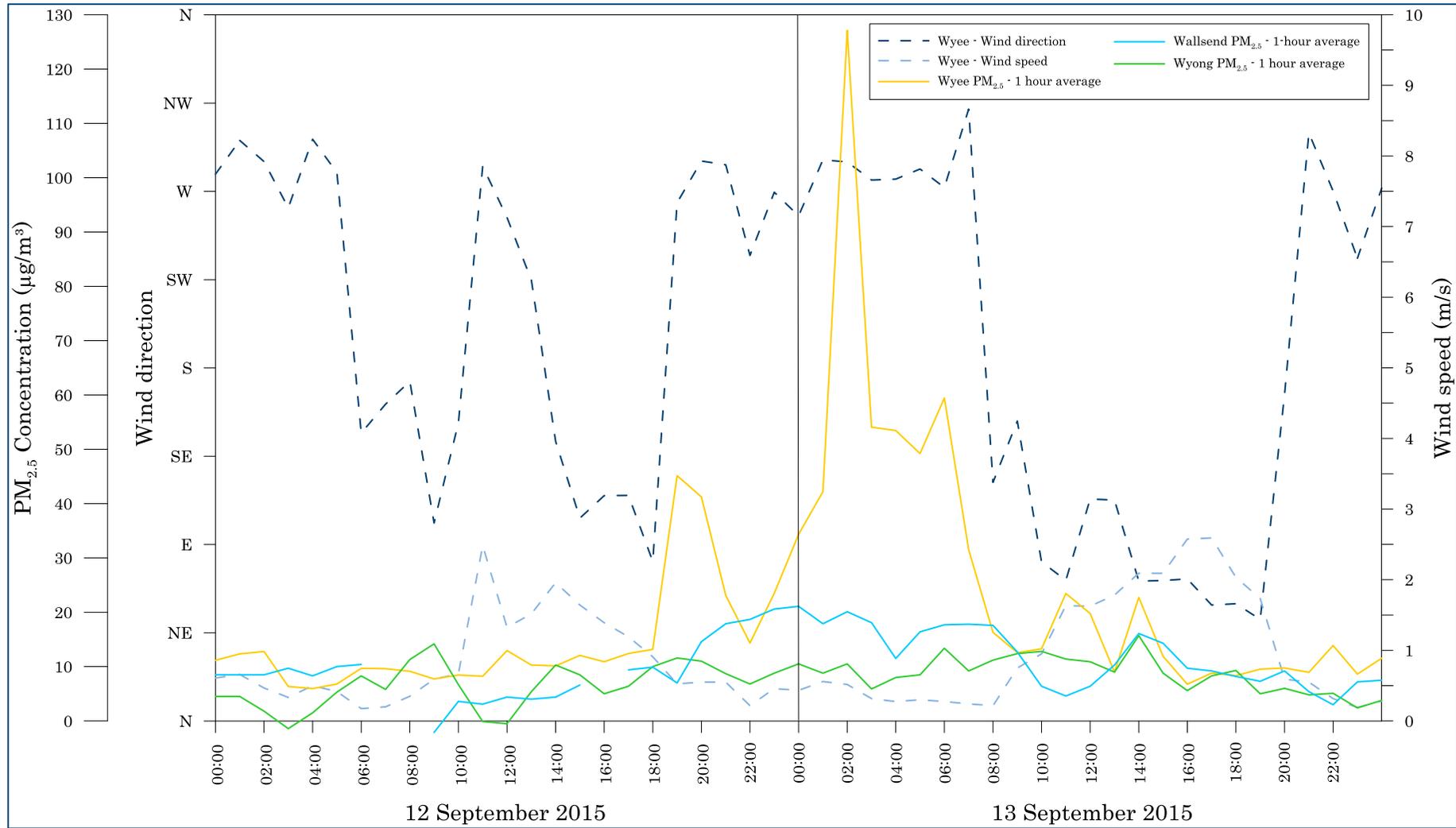


Figure 8-2: Analysis of elevated PM_{2.5} levels on 13 September 2015 – Wyee

The Wyee monitor recorded elevated PM_{2.5} levels from 6:00pm on 12 September until 7:00am on 13 September, during calm wind conditions.

9 LONGER TERM TRENDS

This section provides a brief analysis of the annual and seasonal trends in the Lake Macquarie – Wyong air quality monitoring data from 2014 to 2015. It is important to note that there are no criteria which apply to seasonal averages. These data have been presented to provide an illustration of the seasonal trends over the monitoring period.

Table 9-1 presents the annual average pollutant levels recorded at the Lake Macquarie – Wyong air quality sites during 2014 and 2015. The results indicate that all annual average pollutant levels were below the applicable criteria in 2014 and 2015.

Table 9-1: Annual average pollutant levels – 2014 and 2015

Site	PM ₁₀		PM _{2.5}		SO ₂		NO ₂	
	Annual average Impact Criteria (µg/m ³)							
	30		8*		60		62	
	2014	2015	2014	2015	2014	2015	2014	2015
Wallsend	16.9	16.7	6.7	7.3	3.5	2.6	15.5	15.8
Wyong	15.1	14.9	5.5	5.2	1.6	1.6	10.2	9.3
Dora Creek	-	-	-	-	2.3	2.7	11.8	14.0
Marks Point	-	-	-	-	3.2	4.0	11.2	8.6 ¹
Wyee	-	-	5.9	7.1	2.5	4.0	12.5	11.7
Wakefield HVAS	13.2	14.1	-	-	-	-	-	-
Teralba HVAS	-	14.8	-	-	-	-	-	-

* Advisory reporting standard for PM_{2.5} concentrations (refer to Section 5.1)

¹ 74% data capture in Q4 of 2015

- Not applicable

Figure 9-1 presents seasonal averages of the PM₁₀, PM_{2.5}, NO₂ and SO₂ monitoring data recorded in the Lake Macquarie - Wyong region in 2014 and 2015. It should be noted that only one month of data was available to calculate the summer averages at the end of 2015.

The data in **Figure 9-1** show that PM₁₀ levels in the Lake Macquarie - Wyong region were generally highest during the warmer seasons of spring and summer. This is likely due to the natural seasonal variation of dust levels in which warmer weather typically raises the potential for drier ground and elevates the occurrence of windblown dust, bushfires and pollen levels.

PM_{2.5} levels in the Lake Macquarie - Wyong region were relatively consistent over 2014 and 2015. The Wyee monitor recorded an increase in annual average PM_{2.5} levels from 5.9µg/m³ in 2014 to 7.1µg/m³ in 2015. The monitor recorded lower levels from winter 2014 to autumn 2015 which may have been due to different monitoring equipment used at the site during this time.

NO₂ levels were generally higher in the cooler seasons of autumn and winter in the Lake Macquarie - Wyong region. This may be due to the relatively lower photochemical use of NO_x (to create tropospheric ozone) in winter and autumn when compared to summer and spring. The Wallsend monitor generally recorded higher levels than those at other locations.

SO₂ levels were generally consistently low in the Lake Macquarie - Wyong region with no obvious seasonal trends. The Wyee monitor showed a slight increasing trend over the two years, however the levels remain low.

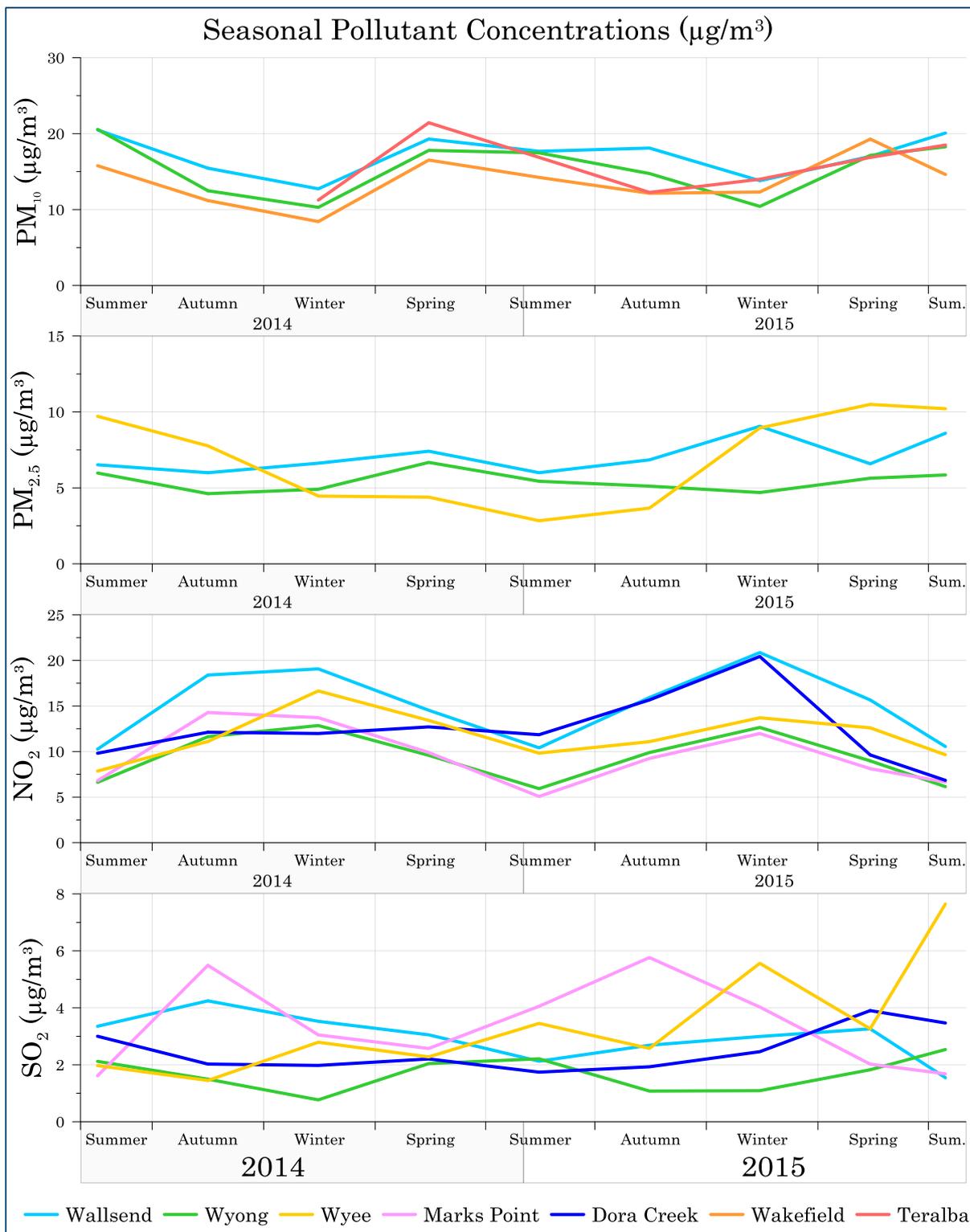


Figure 9-1: Seasonal Pollutant Concentrations (2014-2015)

10 CONCLUSIONS

The results indicate that the monitoring stations generally recorded good air quality in 2015.

The Wallsend and Wyong TEOM monitors recorded 24-hour average levels above the criterion of $50\mu\text{g}/\text{m}^3$ on 6 May 2015. These elevated levels were very likely caused by a dust storm which led to levels above the criteria at almost all of the monitoring locations in NSW.

The Wyee monitor recorded a 24-hour average $\text{PM}_{2.5}$ level above the advisory reporting standard of $25\mu\text{g}/\text{m}^3$ on 13 September 2015. The elevated $\text{PM}_{2.5}$ levels were recorded from 6:00pm on 12 September until 7:00am on 13 September, during calm wind conditions and likely originated from a local source (such as a household wood heater) nearby to the monitor.

All recorded annual average levels were below the applicable annual average criteria in 2015.

Relative to the Air Quality Index:

- ✦ The measured PM_{10} levels were very good or good. The Wallsend, Wyong, Teralba and Wakefield monitors recorded fair levels on six, four, four and one days respectively. On 6 May 2015 the Wallsend and Wyong monitors recorded very poor and poor levels respectively;
- ✦ The measured levels of $\text{PM}_{2.5}$ were generally very good to good. The Wyee and Wallsend monitors recorded eleven and eight days with fair levels respectively. The Wyee monitor also recorded a day with poor levels on 13 September 2015;
- ✦ The measured levels of NO_2 were very good or good at all monitors at all times with the exception of the Dora Creek monitor which recorded two hours with fair levels; and,
- ✦ The measured levels of SO_2 were very good at all monitors at all times with the exception of the Wyong monitor which recorded one hour with good levels.

On this basis it can be concluded that the air quality in the Lake Macquarie - Wyong region was generally good in 2015.

11 REFERENCES

NEPC (2001)

"National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 5 Data Collection and Handling", National Environment Protection Council, May 2001.

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"Variation to the National Environment Protection (Ambient Air Quality) Measure for Particles as PM_{2.5}", National Environment Protection Council, May 2003.

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NSW OEH (2015a)

Mallee dust storm blankets NSW, Office of Environment & Heritage website.
<<http://www.environment.nsw.gov.au/media/OEHmedia15050602.htm>>

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Air quality data NSW, Office of Environment & Heritage website.
<www.environment.nsw.gov.au/AQMS/search.htm>

USEPA (2013)

Health Effects of Pollution, United States Environmental Protection Agency website.
<<http://www.epa.gov/region07/air/quality/health.htm>>, accessed May 2013.

Appendix A

How to read a windrose

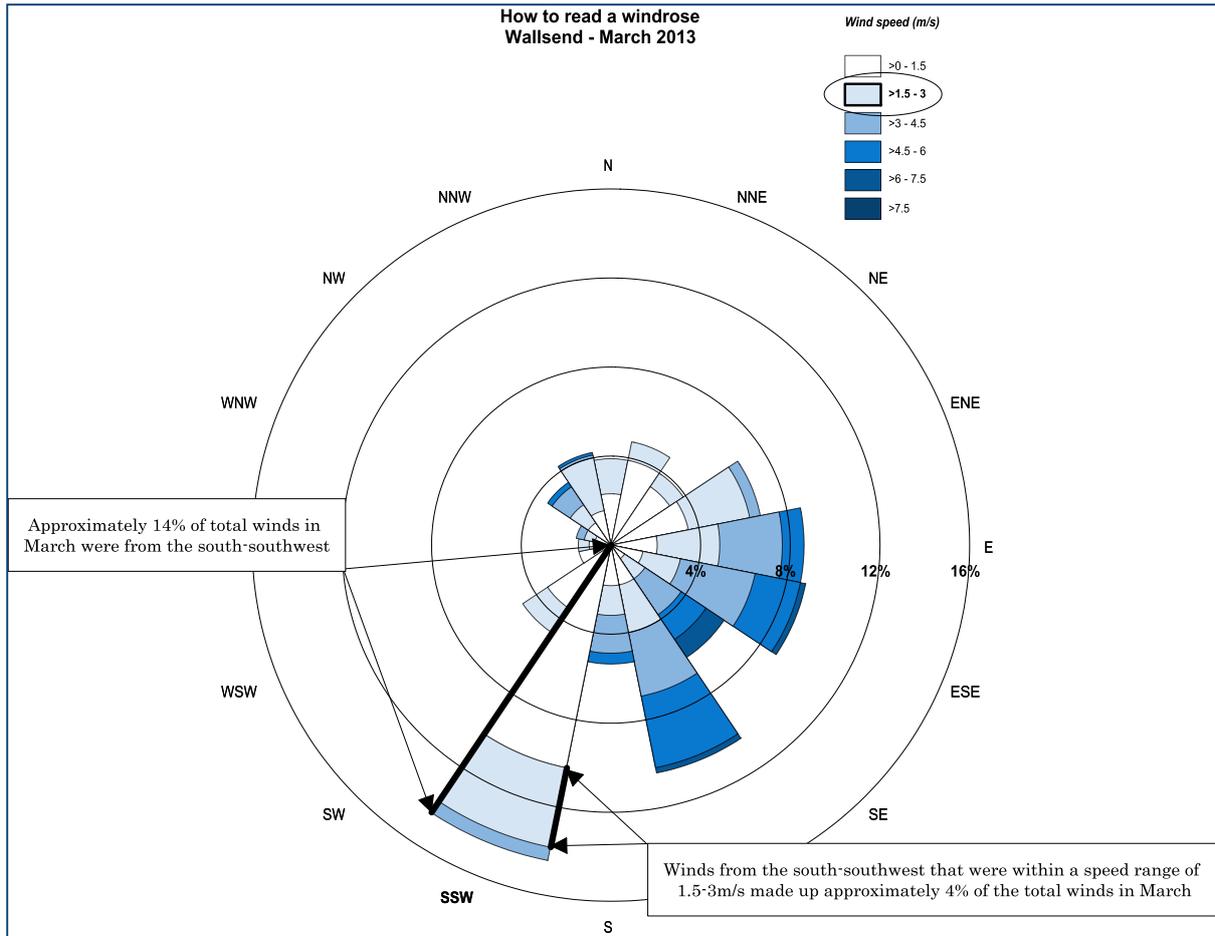


Figure A-1: How to read a windrose

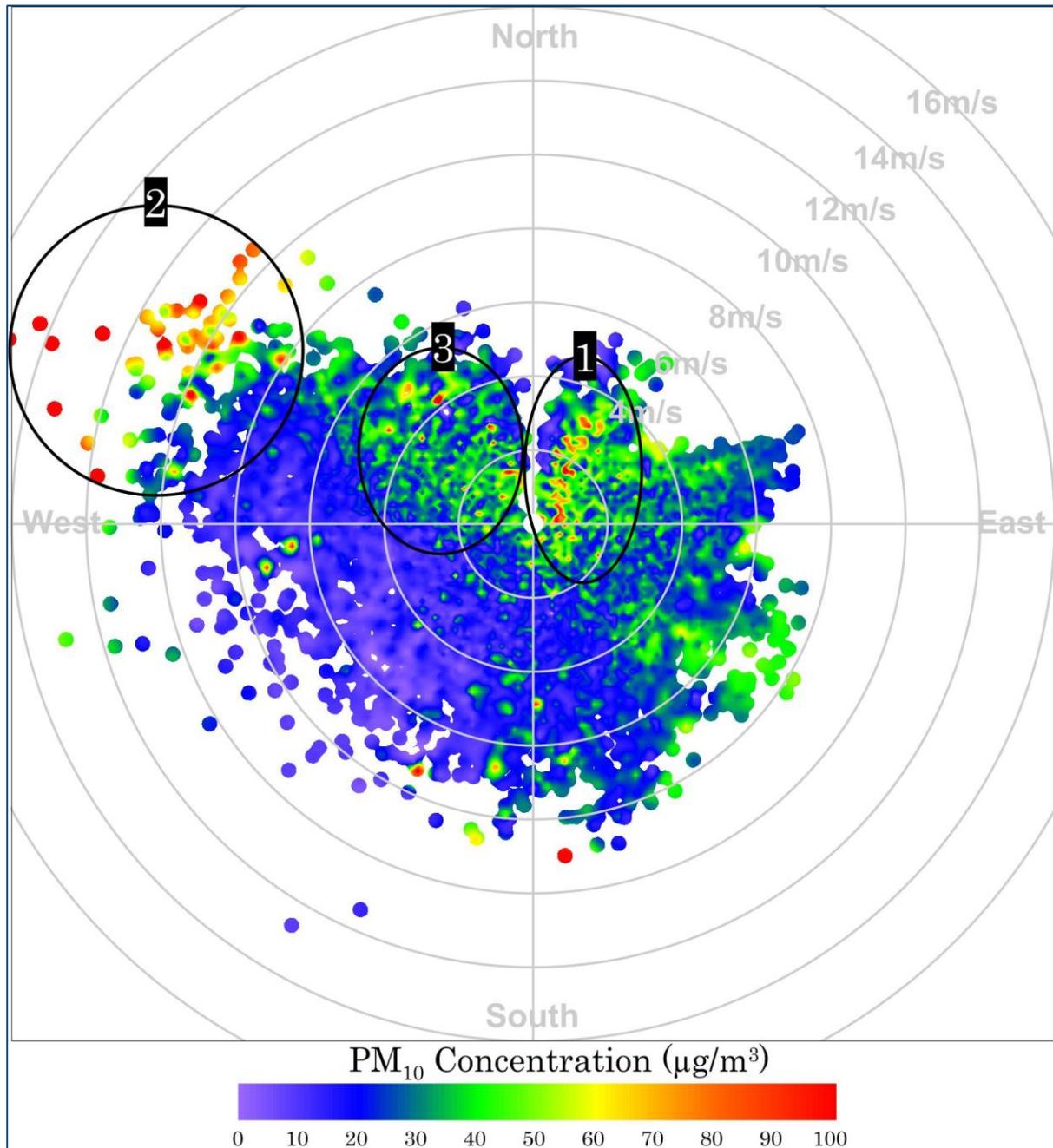


Figure A-2: Example Pollution Rose

- ✦ **1** - High PM₁₀ levels tended to originate from the north-eastern directions under wind speeds below 4m/s.
- ✦ **2** - High PM₁₀ levels were also recorded from the northwest and west-northwest direction under high wind speeds (>8m/s).
- ✦ **3** - Some high levels were also recorded from the northwest under moderate wind speeds.

Appendix B

Monitoring Data (Graphical)

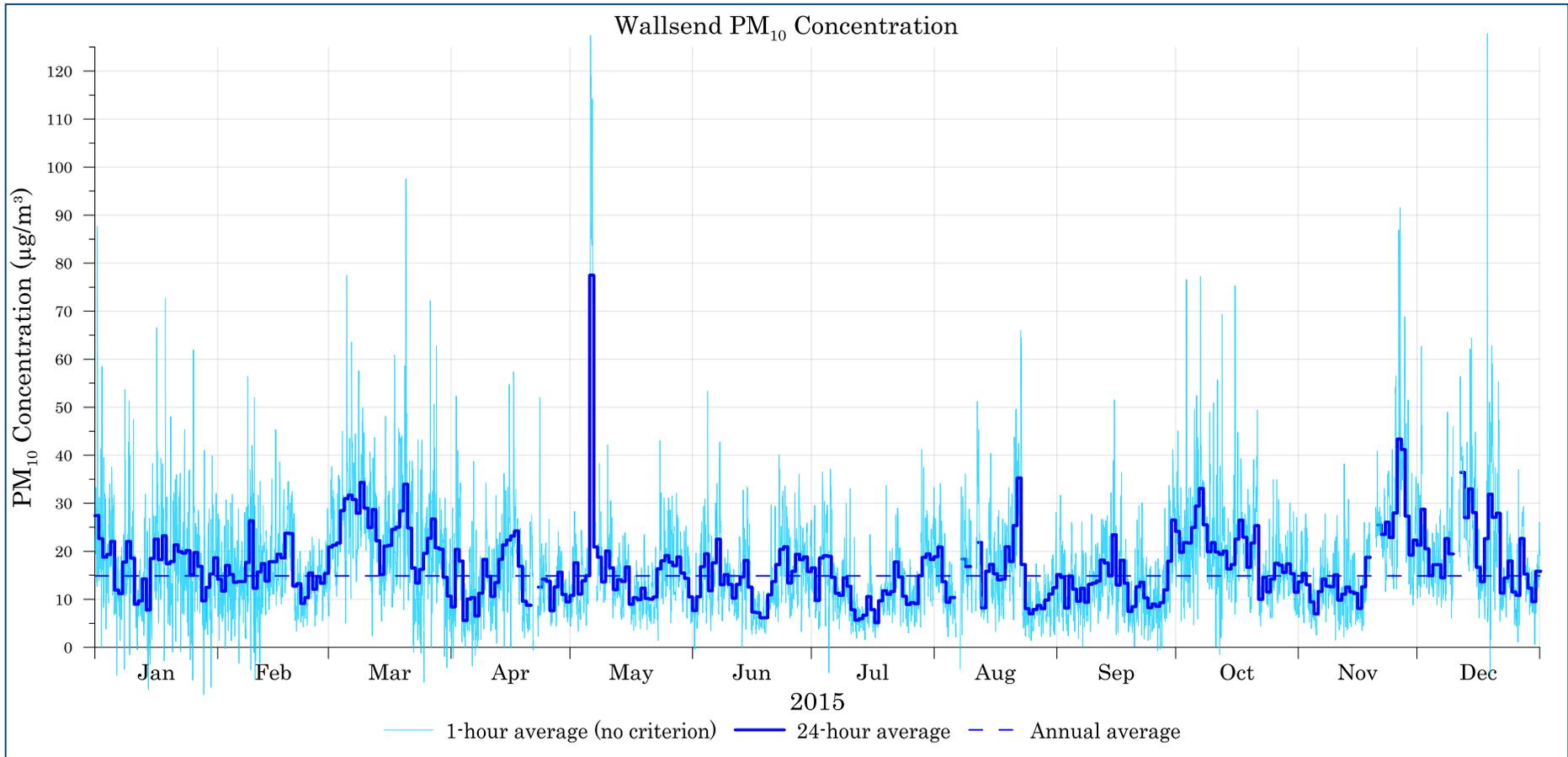


Figure B-1: Wallsend PM₁₀ (1-hour, 24-hour and annual average) concentration - 2015

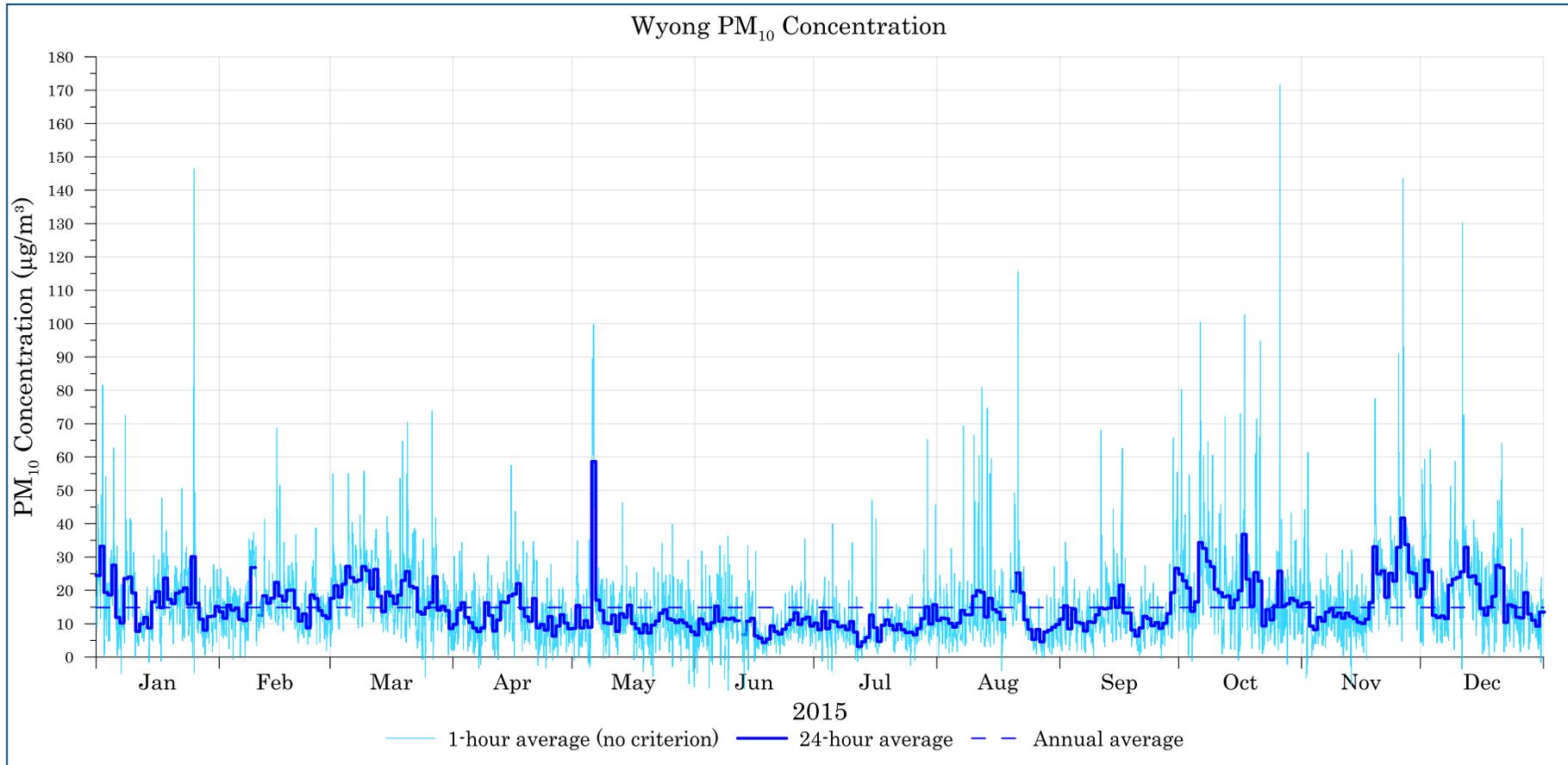
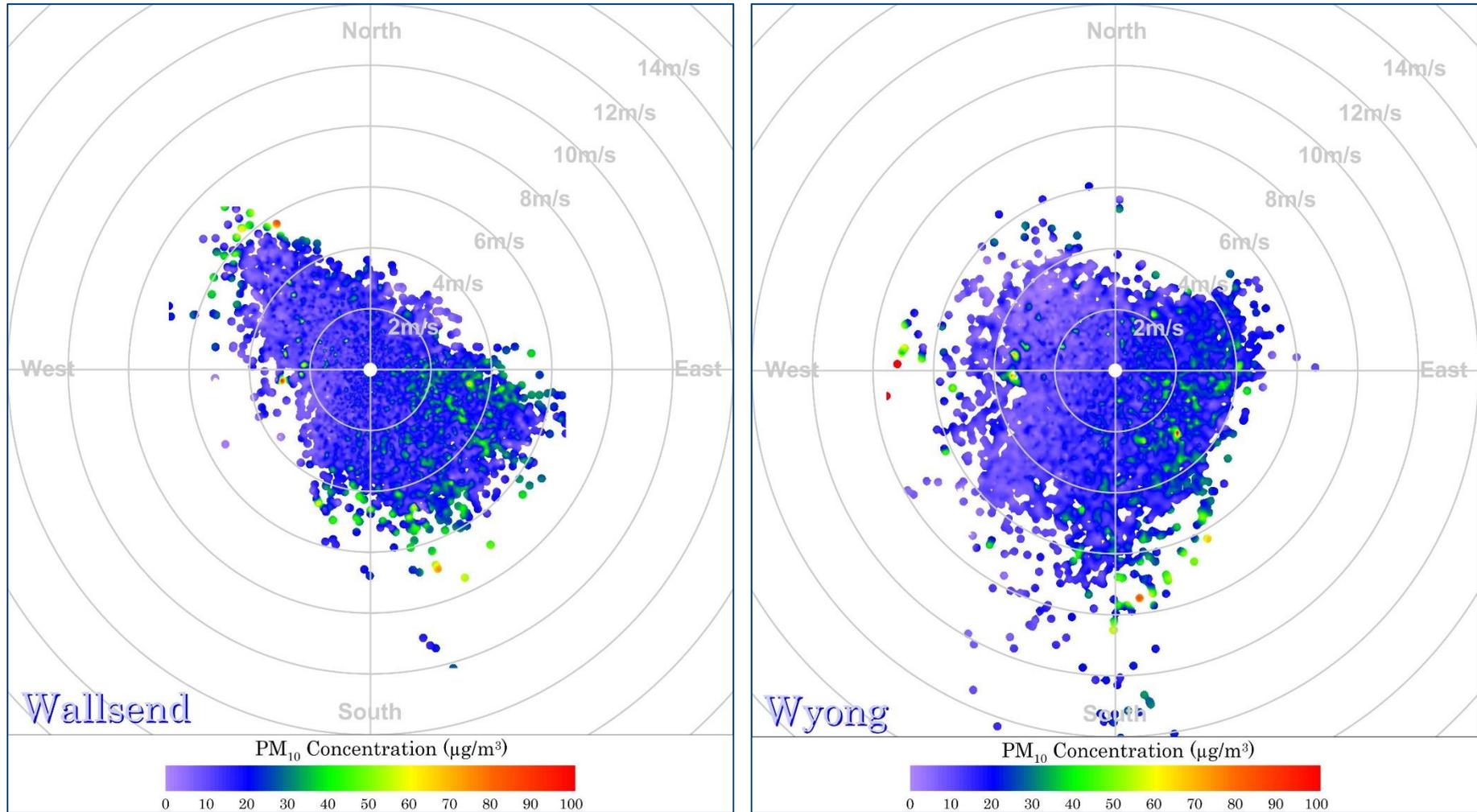


Figure B-2: Wyong PM₁₀ (1-hour, 24-hour and annual average) concentration – 2015



The Wallsend and Wyong monitors generally recorded low PM₁₀ levels in 2015. Levels were relatively higher from the southern and eastern directions. The Wallsend monitor also recorded moderately high levels under 6m/s winds from the northwest.

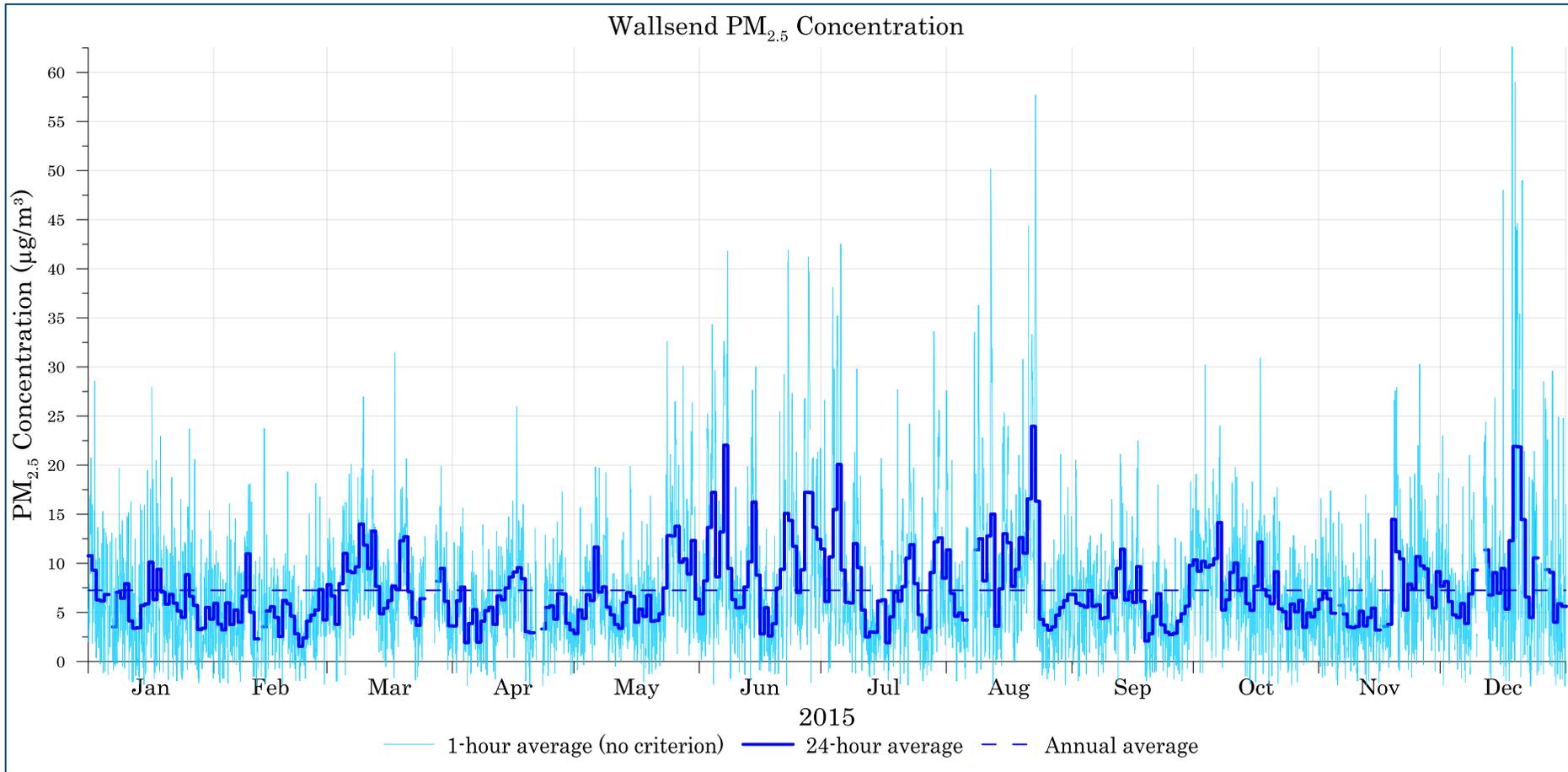


Figure B-4: Wallsend PM_{2.5} (1-hour, 24-hour and annual average) concentration – 2015

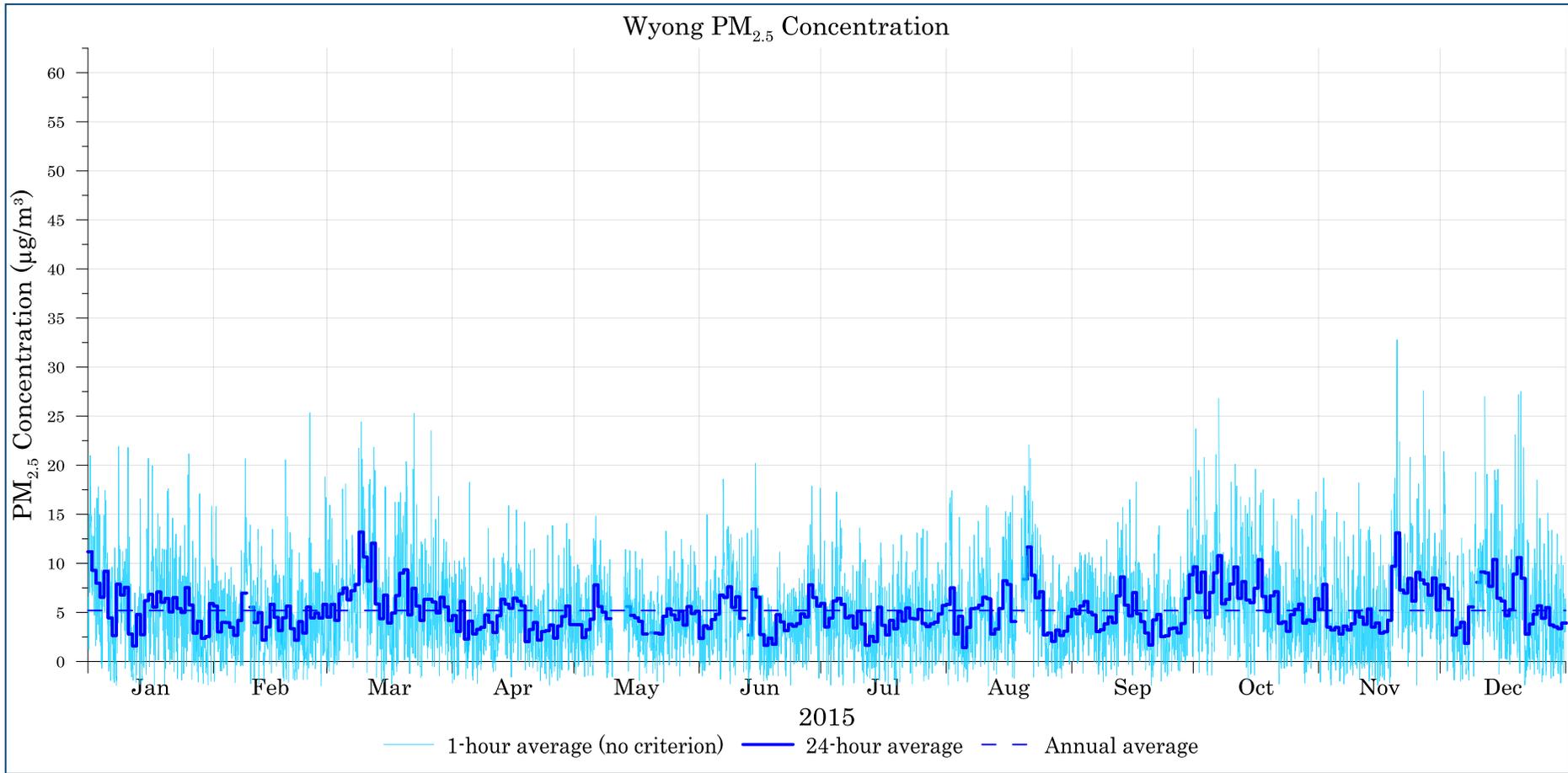


Figure B-5: Wyong PM_{2.5} (1-hour, 24-hour and annual average) concentration – 2015

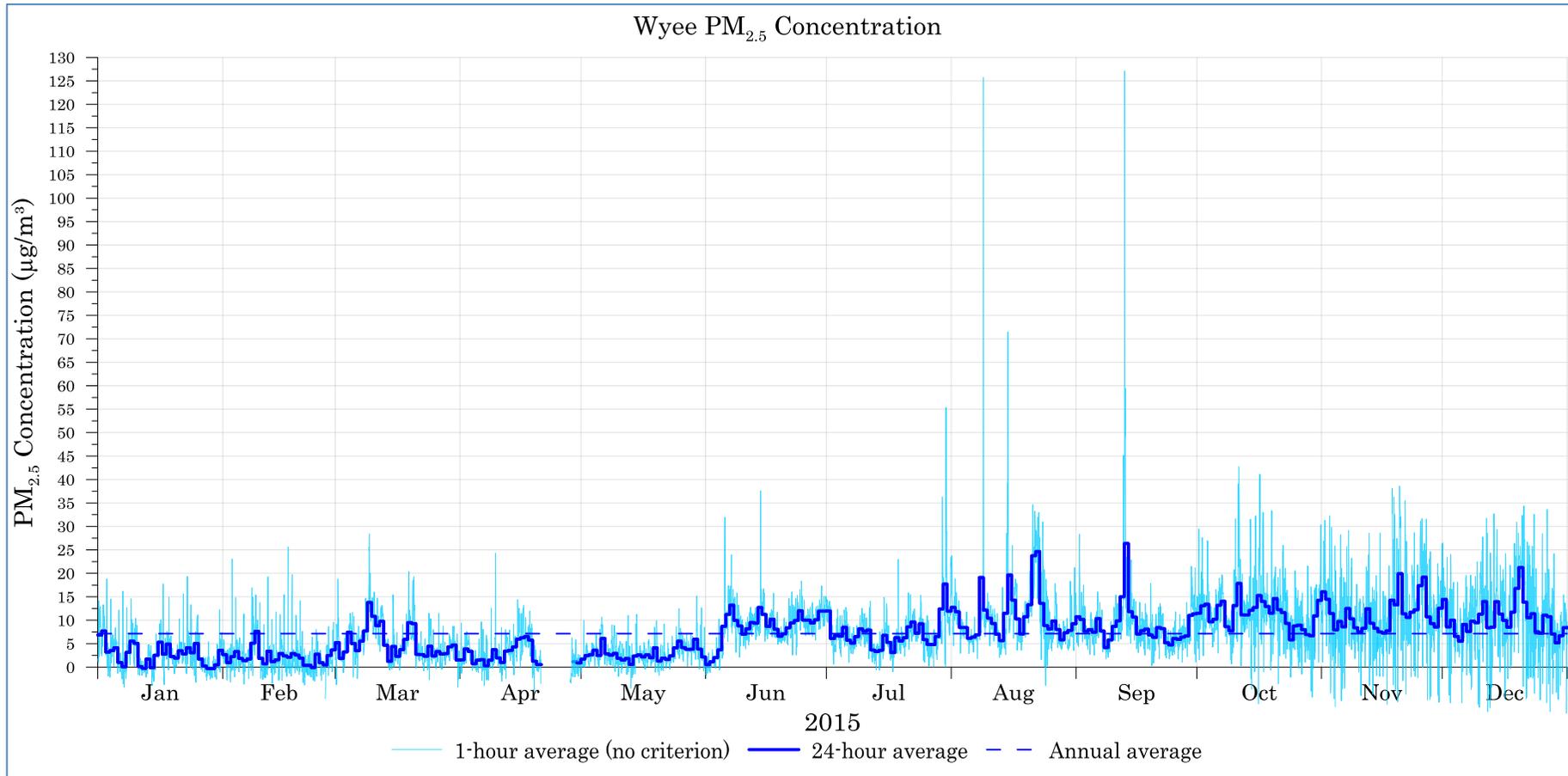


Figure B-6: Wyee PM_{2.5} (1-hour, 24-hour and annual average) concentration - 2015

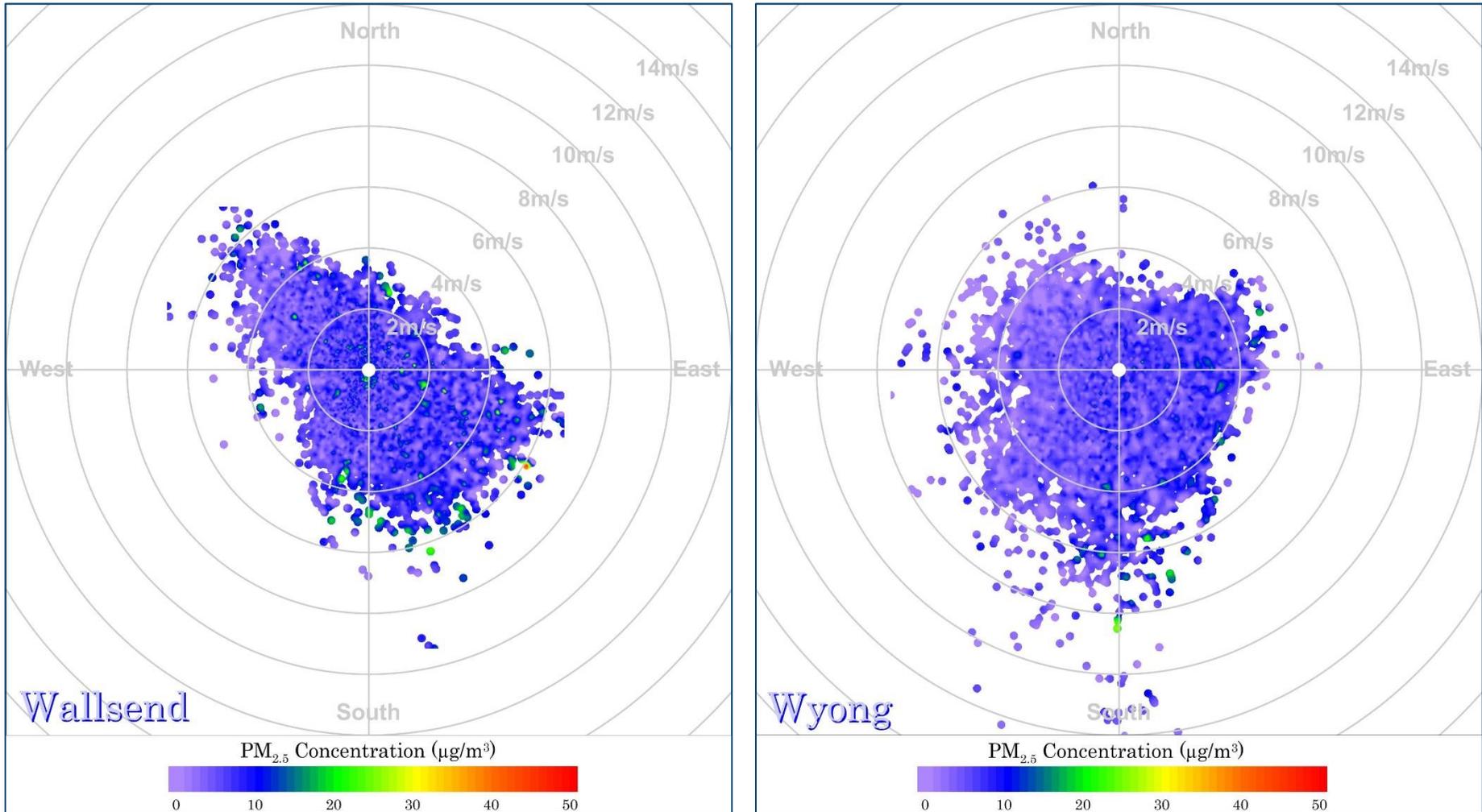


Figure B-7: 2015 PM_{2.5} pollution roses – Wallsend (left) and Wyong (right)

The Wallsend and Wyong monitors generally recorded low PM_{2.5} levels in 2015.

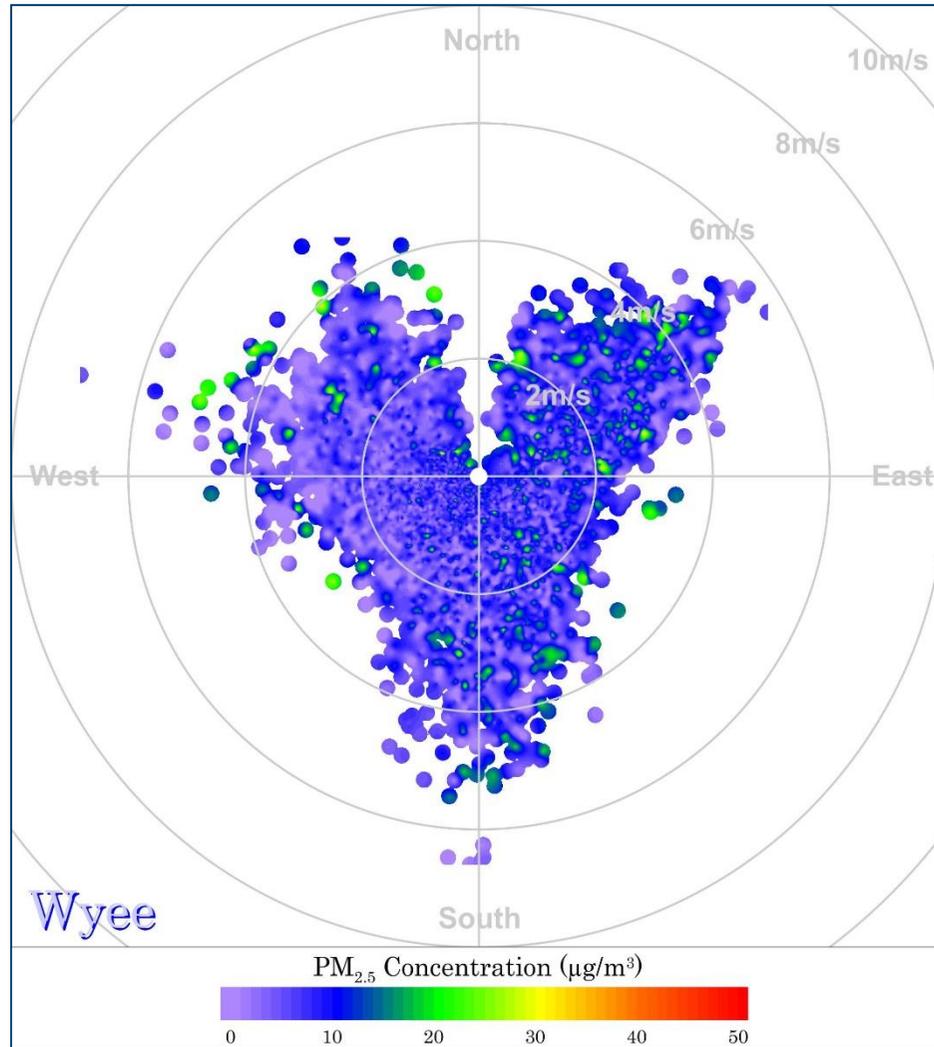


Figure B-8: 2015 PM_{2.5} pollution rose – Wyee

The Wyee monitor generally recorded low PM_{2.5} levels in 2015.

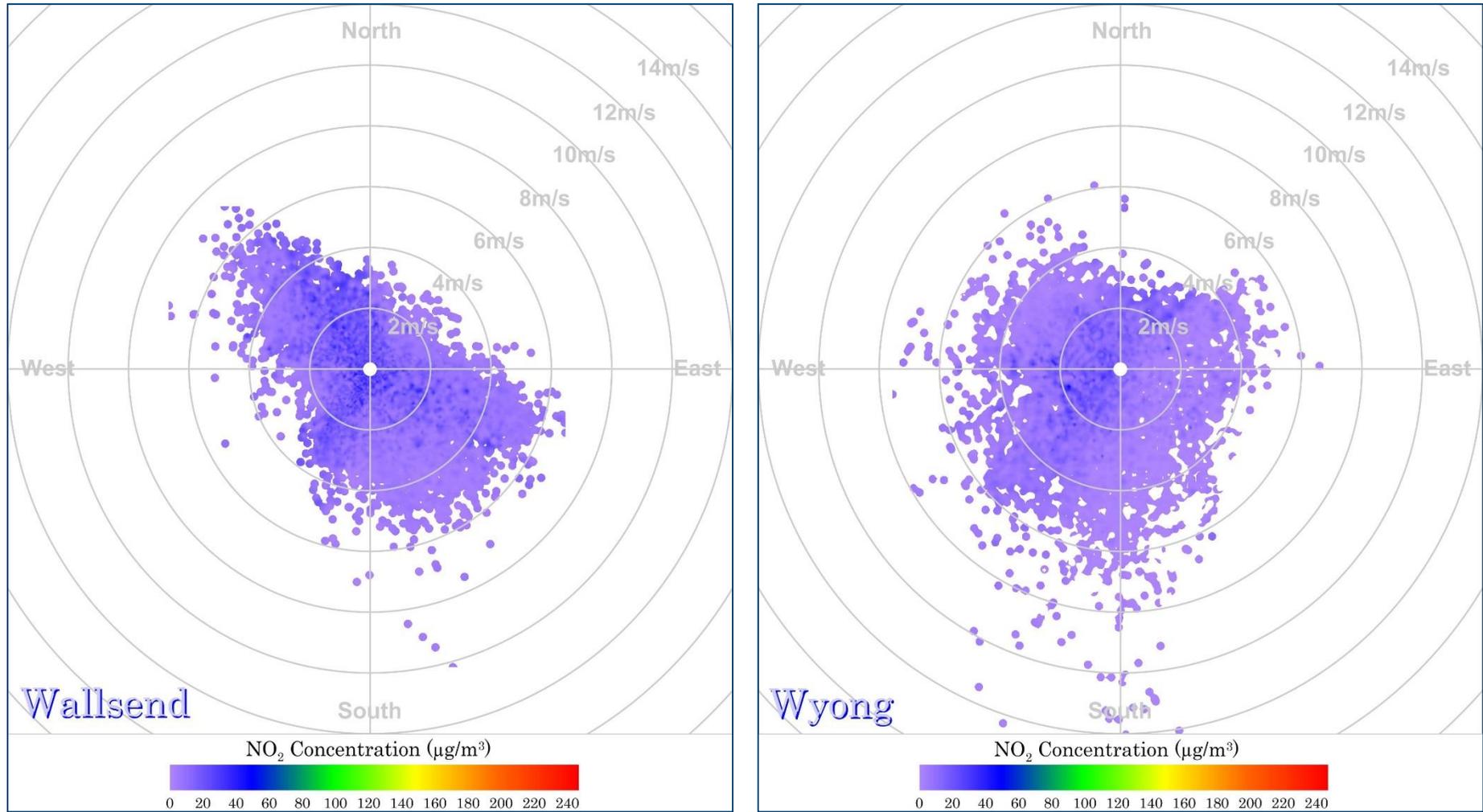


Figure B-9: 2015 NO₂ pollution roses – Wallsend (left) and Wyong (right)

The Wallsend and Wyong monitors generally recorded low NO₂ levels in 2015.

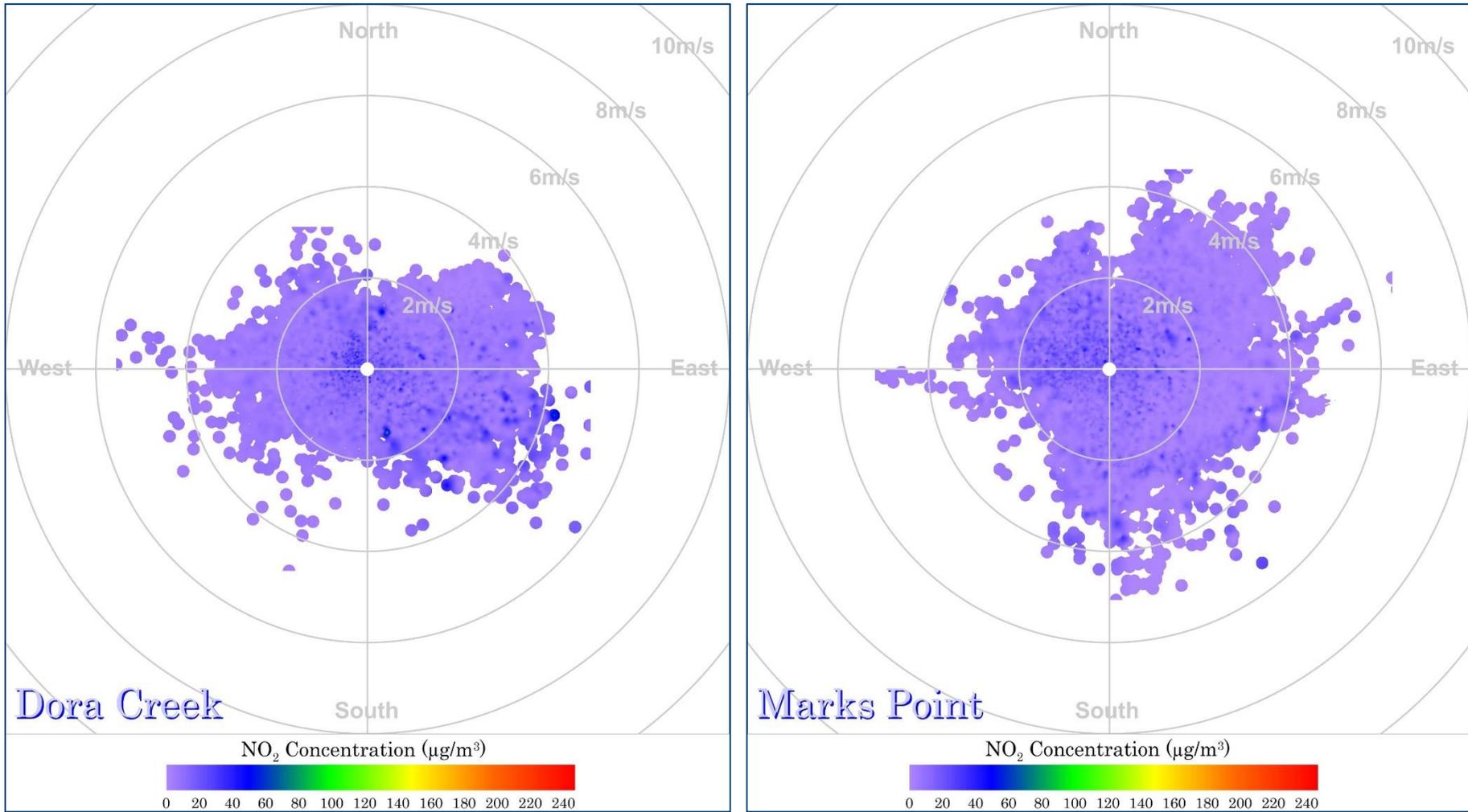


Figure B-10: 2015 NO₂ pollution roses – Dora Creek (left) and Marks Point(right)

The Dora Creek and Marks Point monitors generally recorded low NO₂ levels in 2015.

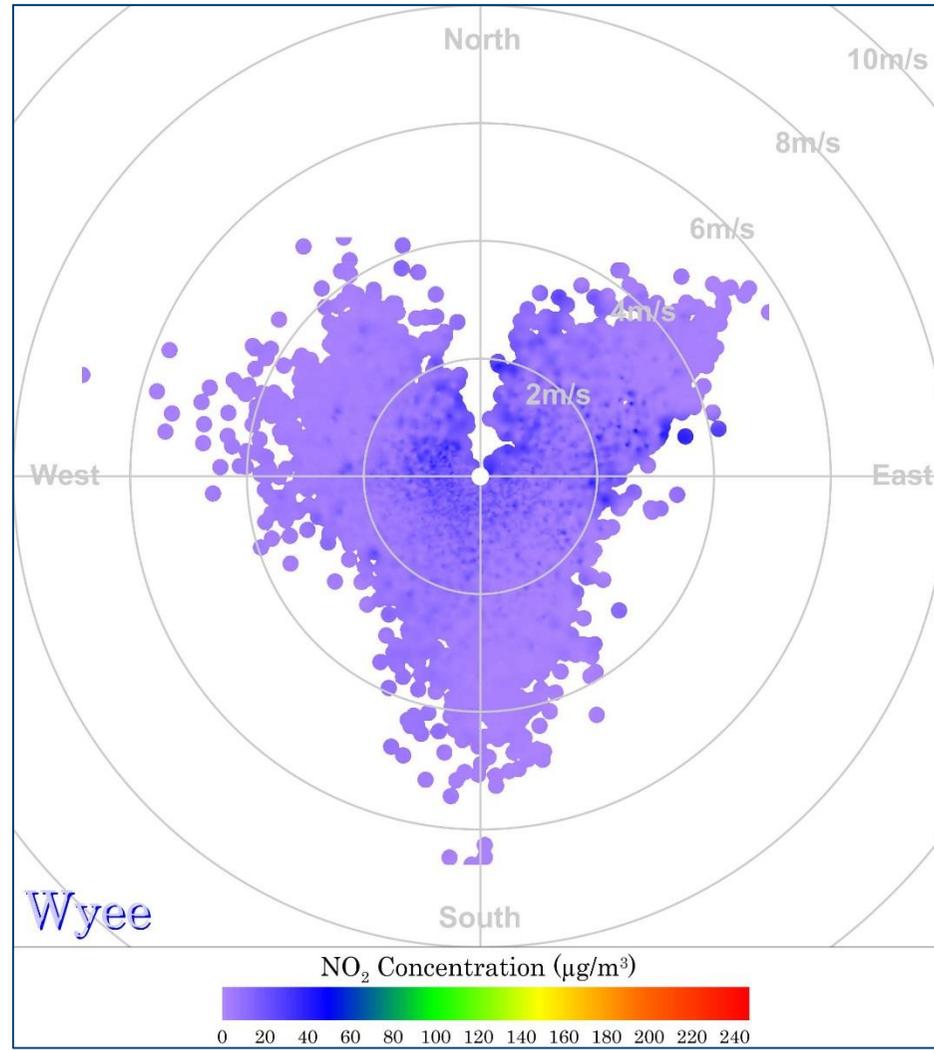


Figure B-11: 2015 NO₂ pollution rose – Wyee

The Wyee monitor generally recorded low NO₂ levels in 2015.

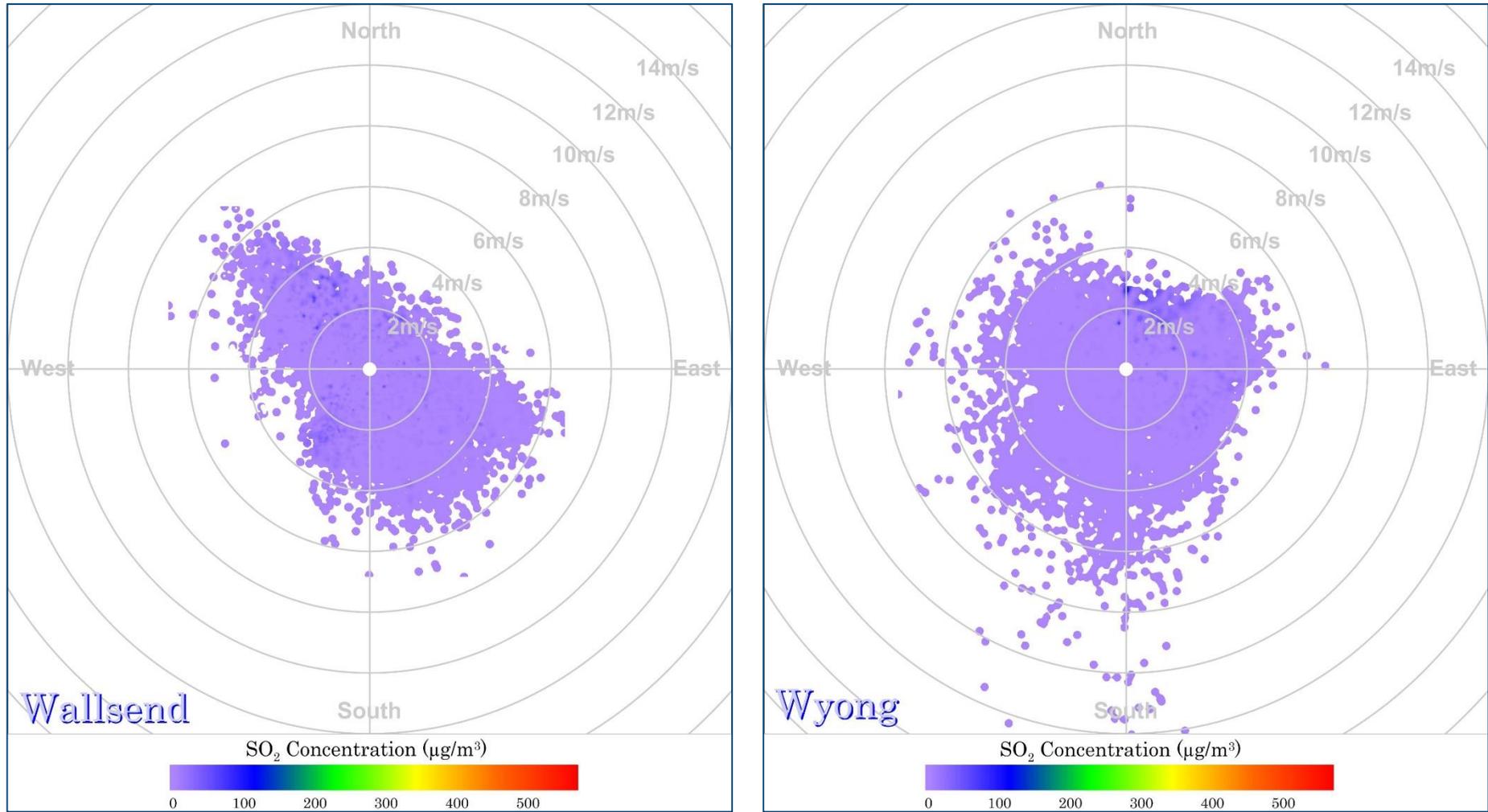
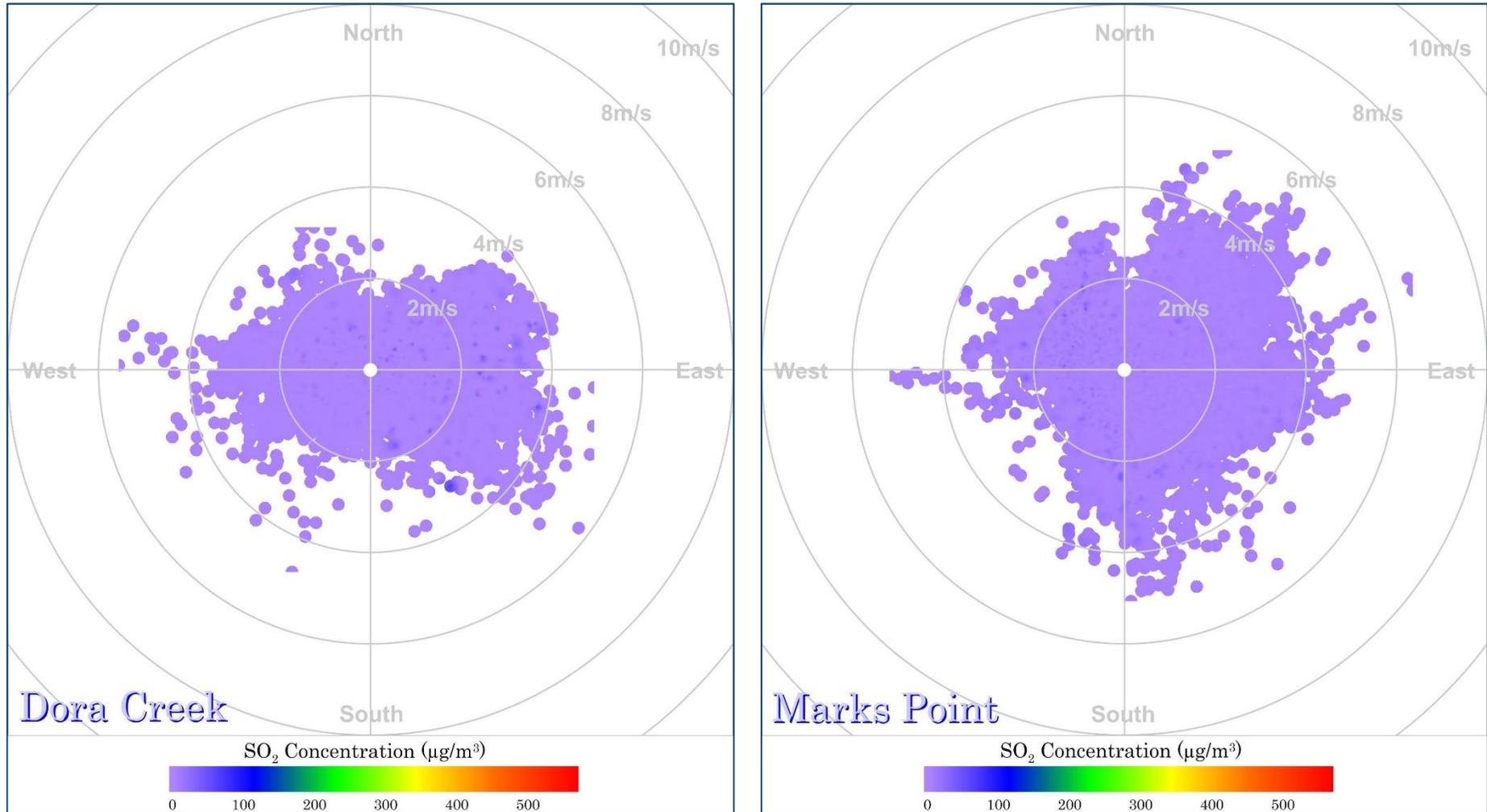


Figure B-12: 2015 SO₂ pollution roses – Wallsend (left) and Wyong (right)

The Wallsend and Wyong monitors generally recorded low SO₂ levels in 2015.



The Dora Creek and Marks Point monitors generally recorded low SO₂ levels in 2015.

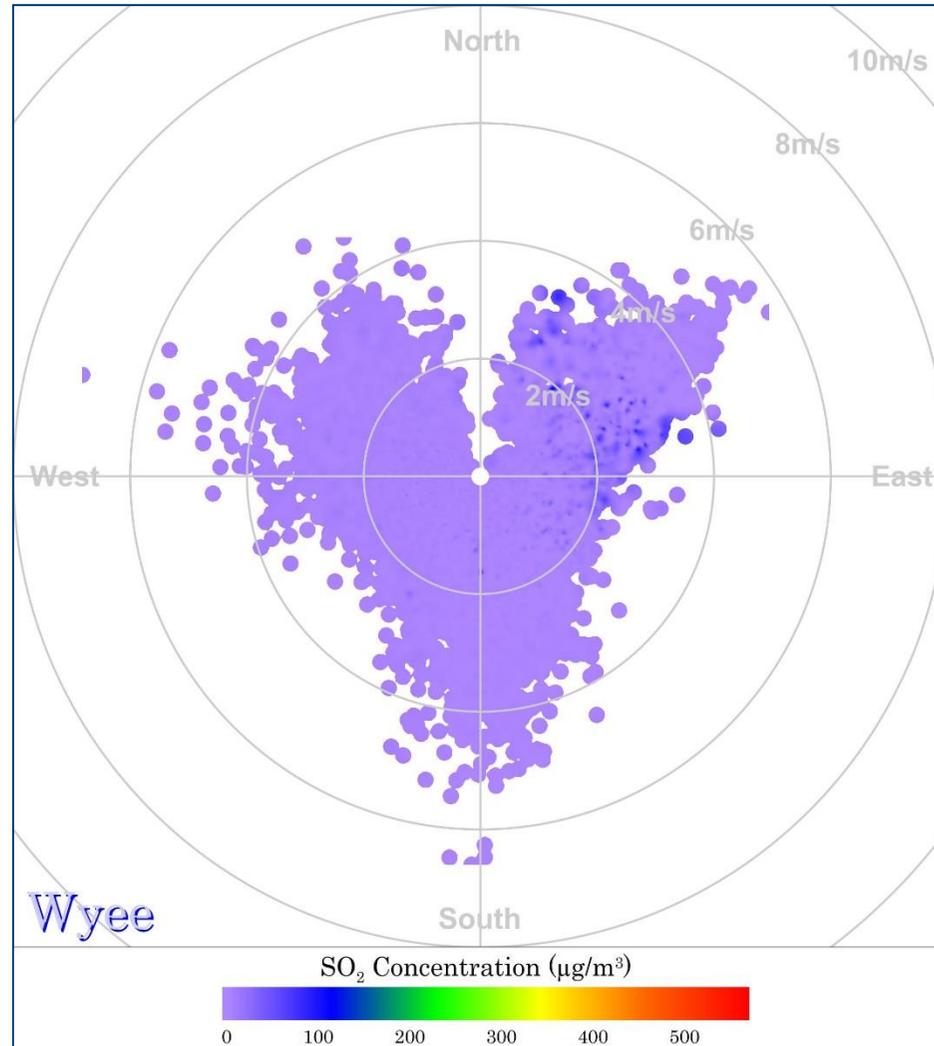


Figure B-14: 2015 SO₂ pollution rose – Wyee

The Wyee monitor generally recorded low SO₂ levels in 2015.

Appendix C
Monitoring Data (Tabulated)

Table C-1: 24-hour average monitoring data

Date	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)			SO ₂ (µg/m ³)				
	Wallsend	Wyong	Wallsend	Wyong	Wyee	Wallsend	Wyong	Dora Creek	Marks Point	Wyee
1/01/2015	27.4	24.4	10.8	11.2	6.9	4.2	4.7	2.6	4.1	7.4
2/01/2015	22.6	33.2	9.3	9.3	7.7	2.7	-0.3	1.9	3.4	0.9
3/01/2015	18.8	19.3	6.3	8.0	3.2	8.0	2.9	2.7	4.9	1.2
4/01/2015	19.3	18.7	6.2	6.5	3.5	3.1	0.9	1.4	4.0	0.5
5/01/2015	22.0	27.6	6.8	9.2	4.1	2.0	-0.3	1.3	4.0	0.0
6/01/2015	11.9	11.9	-	4.4	1.0	-	0.2	1.7	5.2	17.9
7/01/2015	11.2	10.2	3.5	2.6	0.1	-	4.9	1.5	3.7	3.0
8/01/2015	17.7	23.6	7.1	7.9	3.2	-3.9	8.6	1.7	4.2	11.9
9/01/2015	22.0	24.0	6.4	6.8	5.5	0.3	8.5	0.7	6.2	1.7
10/01/2015	18.6	19.2	7.9	7.6	5.1	-0.4	3.6	1.2	5.7	4.4
11/01/2015	9.0	7.7	4.1	2.8	0.1	-2.5	-0.4	0.8	3.5	0.0
12/01/2015	9.7	9.9	3.4	1.6	-0.3	-1.8	0.3	1.6	4.4	0.0
13/01/2015	14.3	11.9	3.4	4.8	1.7	-	2.9	0.6	7.4	4.5
14/01/2015	7.8	8.7	5.7	2.7	-0.1	-0.3	0.8	1.0	7.1	0.8
15/01/2015	18.5	16.6	5.9	6.2	2.5	0.0	0.8	2.1	4.8	2.7
16/01/2015	22.5	19.6	10.1	6.8	5.3	0.5	3.7	1.3	5.0	7.8
17/01/2015	18.2	14.8	6.3	5.5	2.7	-0.2	1.1	1.8	6.9	7.8
18/01/2015	23.2	23.7	9.4	7.1	4.9	1.4	-0.1	2.1	5.8	0.0
19/01/2015	17.4	17.3	7.1	6.0	2.3	-1.2	-0.1	1.5	3.5	0.0
20/01/2015	17.9	16.1	5.8	6.4	1.9	-0.2	3.2	1.0	4.6	2.7
21/01/2015	21.3	19.1	6.8	5.1	3.5	-0.2	6.3	3.2	4.8	10.4
22/01/2015	19.9	19.7	5.9	6.5	2.8	0.9	0.1	1.0	4.7	16.0
23/01/2015	19.6	20.7	5.1	5.4	4.1	-	11.9	0.9	4.6	9.3
24/01/2015	20.1	15.8	4.5	5.0	3.1	3.6	1.3	2.1	4.5	2.1
25/01/2015	15.0	30.1	8.8	7.5	5.1	1.4	0.9	0.8	6.4	1.1
26/01/2015	19.8	16.2	6.6	5.8	1.7	-0.1	-0.1	1.9	4.0	0.0
27/01/2015	16.9	11.4	5.7	2.9	0.2	0.1	0.0	2.0	4.3	0.3
28/01/2015	9.7	8.1	3.2	4.1	-0.3	2.0	0.5	1.3	3.7	0.0
29/01/2015	12.5	12.1	3.4	2.4	-0.3	4.6	0.8	-	8.0	0.0
30/01/2015	15.2	12.3	5.5	2.5	0.5	-0.4	0.4	1.2	5.7	0.4
31/01/2015	18.6	15.2	4.3	5.9	3.6	4.0	1.8	2.4	4.9	6.5
1/02/2015	14.2	13.6	5.9	5.7	2.7	-0.2	0.4	2.9	4.4	0.1
2/02/2015	11.7	11.6	3.8	3.0	0.9	-0.7	0.6	1.4	3.4	0.0
3/02/2015	17.0	15.6	3.2	4.0	2.2	-0.6	0.7	1.7	4.1	0.0
4/02/2015	15.2	14.1	6.0	4.0	3.3	0.1	0.3	0.8	4.7	0.3
5/02/2015	13.5	14.7	3.8	3.5	1.8	0.3	0.1	0.9	4.0	0.1
6/02/2015	13.7	11.3	5.2	2.7	1.4	0.1	-0.4	1.5	3.7	0.1
7/02/2015	13.7	10.9	4.0	4.2	1.7	1.4	2.2	1.7	3.8	3.6
8/02/2015	17.7	16.1	6.7	7.0	5.1	6.4	4.5	-	6.7	3.1
9/02/2015	26.3	26.8	11.0	-	7.6	-1.1	1.0	2.1	3.8	0.0
10/02/2015	12.3	-	5.0	5.5	1.8	-0.2	2.8	1.3	4.3	8.6
11/02/2015	15.7	12.5	2.3	4.0	0.7	1.2	-	2.4	3.7	5.2
12/02/2015	17.4	18.3	-	5.0	3.4	-	-	1.9	4.5	3.9
13/02/2015	13.8	16.1	3.5	2.2	1.2	-	1.7	1.6	4.0	0.0
14/02/2015	17.8	17.7	5.1	3.5	1.6	-	3.5	1.8	4.9	1.7
15/02/2015	17.8	22.4	5.6	5.8	2.9	-	5.5	1.8	6.1	5.2
16/02/2015	19.4	18.3	4.5	4.5	2.4	-	3.2	2.2	4.0	1.7
17/02/2015	18.6	16.9	2.5	3.1	2.1	1.3	5.7	1.9	4.6	0.1
18/02/2015	23.8	20.0	6.2	4.5	2.9	3.7	2.5	1.2	4.7	0.3
19/02/2015	23.7	20.1	5.9	5.7	2.6	0.6	1.6	2.6	5.7	0.0
20/02/2015	12.7	14.7	4.6	3.4	1.9	1.4	0.8	0.9	4.8	-1.3
21/02/2015	13.3	10.8	2.8	2.2	0.4	-0.3	2.6	2.5	4.1	2.8
22/02/2015	9.1	13.0	1.5	4.1	0.4	3.0	0.7	1.6	4.1	0.5
23/02/2015	10.3	8.8	2.4	2.9	-0.1	0.9	0.3	0.9	4.3	4.8
24/02/2015	15.5	18.6	4.1	5.6	2.7	2.5	2.2	3.2	3.6	0.9
25/02/2015	12.1	17.5	4.7	4.4	0.9	2.9	-	2.5	3.9	0.7
26/02/2015	14.8	14.0	5.2	4.9	0.5	4.8	-	2.4	5.0	0.0

Date	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)			SO ₂ (µg/m ³)				
	Wallsend	Wyong	Wallsend	Wyong	Wyee	Wallsend	Wyong	Dora Creek	Marks Point	Wyee
27/02/2015	13.4	12.5	7.3	4.4	2.5	1.7	-	0.9	3.7	0.0
28/02/2015	15.4	11.6	4.2	5.8	3.7	5.3	4.2	1.9	5.5	3.5
1/03/2015	20.9	17.6	7.8	4.5	5.2	3.6	0.7	-	5.5	0.2
2/03/2015	21.3	21.4	6.7	5.8	1.8	0.0	0.1	-	3.9	0.0
3/03/2015	21.7	18.0	3.8	4.2	3.2	1.7	2.0	3.4	4.7	2.7
4/03/2015	28.4	21.8	7.9	6.9	7.4	4.6	1.0	3.1	8.0	3.0
5/03/2015	30.9	27.2	11.0	7.5	5.0	3.1	1.1	4.0	9.8	-0.5
6/03/2015	31.7	23.8	9.2	6.3	3.5	1.4	0.4	3.6	7.9	0.1
7/03/2015	30.8	22.7	9.1	7.2	5.5	4.5	1.0	3.8	4.0	0.5
8/03/2015	27.9	23.1	9.6	7.9	7.7	4.6	2.9	2.7	8.2	3.8
9/03/2015	34.3	27.1	14.0	13.2	13.8	5.8	1.7	2.5	7.6	1.6
10/03/2015	29.0	26.0	11.9	10.6	10.8	1.2	0.7	2.0	5.0	0.0
11/03/2015	24.9	20.4	9.5	8.2	8.8	1.6	4.1	2.7	5.0	3.5
12/03/2015	28.7	26.3	13.3	12.1	9.8	2.3	0.5	4.1	5.2	0.1
13/03/2015	22.2	18.2	7.6	5.9	4.7	-2.2	0.1	2.6	4.1	-0.1
14/03/2015	15.2	13.6	4.9	4.4	1.2	1.7	1.2	1.4	4.7	1.3
15/03/2015	21.1	19.5	5.4	6.8	4.4	0.8	0.3	1.7	5.0	0.0
16/03/2015	21.2	18.3	6.2	3.9	2.3	-0.9	0.8	-	3.8	0.0
17/03/2015	24.6	16.0	7.7	4.9	3.7	4.8	5.6	2.0	5.6	2.6
18/03/2015	25.0	18.5	7.3	6.7	5.9	0.5	2.1	1.3	6.2	1.5
19/03/2015	28.4	22.9	12.3	9.0	9.5	2.6	0.9	2.0	5.3	0.3
20/03/2015	33.9	25.7	12.7	9.3	9.3	0.5	0.9	1.8	8.5	0.5
21/03/2015	24.8	21.2	7.1	4.8	2.7	-1.6	0.2	0.8	4.0	0.0
22/03/2015	16.5	20.7	4.4	7.5	2.7	0.1	0.6	0.8	4.3	3.7
23/03/2015	13.4	13.6	3.7	5.7	2.3	1.4	4.7	-	4.2	0.9
24/03/2015	16.2	12.9	6.4	4.2	4.5	1.0	2.7	1.2	7.3	1.5
25/03/2015	19.6	14.8	-	6.3	2.4	8.0	0.4	0.3	6.4	0.0
26/03/2015	22.7	16.4	-	6.3	3.3	1.4	0.8	-	6.9	0.0
27/03/2015	26.7	24.1	-	6.1	2.8	2.3	1.1	1.2	11.4	0.8
28/03/2015	20.7	14.1	8.2	5.0	2.9	1.1	0.3	-	5.7	0.0
29/03/2015	20.4	15.2	9.5	6.5	4.3	4.3	2.5	1.4	3.8	4.2
30/03/2015	14.6	13.9	6.1	5.6	4.7	3.3	1.4	1.2	4.8	0.3
31/03/2015	10.6	8.5	3.6	4.2	1.5	1.2	0.9	0.7	4.2	0.2
1/04/2015	8.4	9.8	3.6	4.7	1.5	3.8	5.3	-	4.1	8.3
2/04/2015	20.4	14.1	6.2	3.1	3.9	8.7	2.9	1.7	9.1	5.0
3/04/2015	17.9	16.2	7.6	6.1	3.4	0.6	0.2	0.7	3.5	2.9
4/04/2015	5.6	11.9	1.9	2.3	0.7	0.4	0.2	1.0	3.5	2.9
5/04/2015	10.1	10.3	3.9	4.1	1.5	6.9	0.7	3.7	8.5	2.9
6/04/2015	10.4	8.7	5.3	2.8	1.6	5.3	1.3	-	5.5	3.1
7/04/2015	6.5	7.6	2.0	3.3	0.3	0.9	2.3	-	6.5	4.2
8/04/2015	11.3	8.7	4.1	3.5	1.5	0.0	0.3	2.5	5.7	2.9
9/04/2015	18.3	16.3	5.2	4.8	3.7	2.3	0.0	-	6.0	2.9
10/04/2015	14.8	12.5	5.5	4.0	2.0	6.1	0.4	1.0	9.8	2.9
11/04/2015	10.6	7.8	3.8	3.0	1.0	1.1	0.1	-	3.7	3.6
12/04/2015	13.5	11.1	6.7	4.7	3.4	1.9	0.4	1.5	5.1	2.8
13/04/2015	18.3	16.5	6.3	6.3	3.6	1.1	0.7	1.3	4.3	2.9
14/04/2015	21.3	16.4	7.5	5.9	4.3	2.7	1.9	3.1	4.3	8.7
15/04/2015	22.3	18.4	8.6	5.4	6.0	1.8	3.9	2.5	7.0	5.3
16/04/2015	23.2	18.9	9.1	6.5	6.2	-	1.8	1.1	6.9	3.5
17/04/2015	24.2	22.0	9.6	6.1	6.5	-	0.6	0.8	4.0	2.9
18/04/2015	16.9	14.5	8.4	5.7	5.8	1.7	1.8	0.7	7.4	8.2
19/04/2015	9.6	12.1	3.0	2.0	1.3	3.3	0.1	0.6	7.7	2.9
20/04/2015	8.8	10.7	2.9	3.3	0.5	8.3	0.2	-	8.0	2.9
21/04/2015	-	17.5	-	4.0	-	-	0.2	-	4.9	-
22/04/2015	-	8.7	-	2.2	-	-	0.1	-	4.7	-
23/04/2015	12.5	9.7	3.3	3.1	-	-	0.8	-	5.3	-
24/04/2015	14.2	8.1	5.5	3.1	-	-	0.9	-	5.7	-

Date	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)			SO ₂ (µg/m ³)				
	Wallsend	Wyong	Wallsend	Wyong	Wyee	Wallsend	Wyong	Dora Creek	Marks Point	Wyee
25/04/2015	13.8	12.2	5.7	3.7	-	4.7	2.2	-	11.6	-
26/04/2015	7.6	6.3	4.3	2.4	-	0.7	0.4	2.5	9.3	-
27/04/2015	12.6	9.3	6.9	3.6	-	0.7	0.6	1.2	4.9	-
28/04/2015	15.6	12.7	6.9	4.6	-	2.0	0.3	2.3	4.1	-
29/04/2015	11.0	10.2	3.9	5.7	1.2	1.3	0.0	1.9	4.1	2.1
30/04/2015	9.5	8.5	3.2	3.8	0.9	0.3	0.0	3.1	3.1	2.9
1/05/2015	10.8	8.6	2.8	3.8	1.7	1.4	-0.5	3.7	4.0	2.9
2/05/2015	17.6	15.4	5.3	3.8	2.5	-1.4	0.2	1.8	3.5	3.8
3/05/2015	11.1	8.7	4.4	2.4	2.6	1.5	-0.6	1.0	3.7	3.0
4/05/2015	13.8	11.0	6.8	3.3	3.6	11.6	0.2	-	8.4	1.9
5/05/2015	14.9	8.9	6.2	4.3	2.5	4.6	0.9	2.1	6.9	2.4
6/05/2015	77.5	58.6	11.7	7.8	6.1	-0.3	1.8	2.3	8.9	3.1
7/05/2015	20.9	17.1	7.1	5.6	2.8	0.3	1.9	1.9	11.6	3.1
8/05/2015	18.8	14.0	7.6	5.0	2.5	0.3	1.5	-	6.2	3.7
9/05/2015	13.6	10.2	5.5	4.4	2.9	-0.7	0.7	2.2	3.9	2.7
10/05/2015	20.0	10.0	4.8	-	1.9	0.1	0.3	-	3.1	1.5
11/05/2015	16.6	12.6	3.8	-	1.5	-0.9	0.3	2.2	2.5	3.3
12/05/2015	12.0	7.7	3.4	-	1.9	-1.0	0.9	3.0	5.3	3.0
13/05/2015	14.1	13.0	6.0	-	0.6	-1.4	0.7	-	4.8	3.0
14/05/2015	13.7	11.9	7.0	5.6	2.4	0.9	0.4	1.5	4.7	1.3
15/05/2015	16.7	15.6	6.6	4.7	2.6	6.2	0.3	-	4.5	3.4
16/05/2015	9.0	10.1	4.0	4.5	2.2	4.7	0.6	2.5	3.6	3.1
17/05/2015	10.3	8.5	5.3	4.1	2.6	-0.8	0.5	0.9	3.3	3.4
18/05/2015	9.9	7.2	4.6	2.8	2.0	-0.6	0.6	0.8	3.4	0.2
19/05/2015	12.3	9.8	6.7	-	4.1	2.4	5.5	1.9	7.1	7.9
20/05/2015	10.2	7.1	4.1	2.9	1.3	9.5	0.3	-	10.2	3.4
21/05/2015	10.0	9.6	4.2	2.9	1.9	0.8	0.3	3.0	5.7	2.3
22/05/2015	10.5	10.8	4.9	2.8	1.6	-	0.1	1.7	4.5	2.8
23/05/2015	16.3	13.2	7.5	4.6	2.4	-	0.6	2.4	7.8	5.3
24/05/2015	18.0	14.2	12.8	5.4	4.1	-	1.0	1.0	4.3	2.9
25/05/2015	19.1	11.5	12.8	4.7	5.5	-	2.2	-	5.4	6.4
26/05/2015	17.7	11.0	13.8	4.3	4.2	14.3	0.9	1.6	-	3.4
27/05/2015	17.0	10.3	10.1	5.1	3.8	4.5	0.4	2.7	4.3	3.4
28/05/2015	18.8	11.1	10.5	3.7	3.8	7.8	0.8	1.1	3.8	3.6
29/05/2015	15.5	10.2	8.9	5.6	5.9	3.8	0.9	1.7	3.5	3.3
30/05/2015	14.3	9.2	12.3	4.9	3.8	1.6	0.5	-	5.9	2.5
31/05/2015	10.5	7.6	6.4	5.1	2.2	1.5	0.5	2.9	5.0	1.2
1/06/2015	7.6	6.6	4.9	2.3	0.5	1.3	0.0	0.7	6.7	2.1
2/06/2015	10.6	11.4	8.2	3.6	1.1	4.3	0.0	1.3	9.4	5.4
3/06/2015	16.8	9.9	13.7	3.4	2.0	11.6	0.1	-	9.1	3.4
4/06/2015	19.5	8.4	17.2	4.3	3.7	10.8	3.1	-	7.3	6.8
5/06/2015	11.8	10.3	8.6	4.8	8.7	-0.2	0.3	-	5.2	2.3
6/06/2015	17.6	15.2	13.2	6.8	11.2	0.7	0.2	4.3	5.3	3.5
7/06/2015	22.5	10.7	22.0	6.5	13.2	4.9	3.2	1.7	9.7	5.6
8/06/2015	13.1	11.6	9.5	7.6	9.9	2.4	0.5	1.1	4.4	3.2
9/06/2015	15.2	11.4	6.3	5.5	8.8	2.3	1.2	1.6	4.7	3.8
10/06/2015	13.1	11.6	5.5	6.6	7.0	0.8	0.6	-	3.8	2.0
11/06/2015	10.2	10.9	5.5	4.4	8.2	1.0	0.6	0.9	4.8	2.7
12/06/2015	13.1	-	7.6	-	9.5	2.0	-	1.7	6.2	6.2
13/06/2015	14.7	6.8	10.1	2.7	9.4	1.3	1.0	2.4	4.6	4.0
14/06/2015	18.1	10.7	16.2	7.4	12.7	2.8	3.5	-	7.1	8.3
15/06/2015	12.5	11.6	8.8	6.6	11.2	2.2	1.4	1.7	4.3	3.8
16/06/2015	7.3	6.3	2.8	2.7	8.7	5.5	5.1	2.3	8.5	7.1
17/06/2015	7.2	5.7	5.5	1.6	10.2	1.6	-	1.8	3.2	4.8
18/06/2015	6.2	4.4	2.6	2.4	8.1	2.0	-0.1	1.8	3.9	1.2
19/06/2015	6.2	5.4	3.8	1.7	6.6	3.2	0.4	2.5	2.6	2.8
20/06/2015	11.0	9.3	7.5	4.8	7.1	8.0	0.7	1.2	2.8	5.3

Date	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)			SO ₂ (µg/m ³)				
	Wallsend	Wyong	Wallsend	Wyong	Wyee	Wallsend	Wyong	Dora Creek	Marks Point	Wyee
21/06/2015	13.7	7.6	9.4	4.0	8.4	2.0	0.3	2.1	-	3.1
22/06/2015	17.2	6.9	15.1	3.2	9.4	0.6	2.9	3.3	3.9	5.7
23/06/2015	20.4	8.4	14.4	3.8	10.0	3.5	3.0	1.3	3.5	8.3
24/06/2015	20.9	9.7	11.7	3.6	12.0	2.1	6.7	3.9	4.7	6.0
25/06/2015	13.4	11.1	7.0	3.9	10.0	4.3	0.5	0.8	1.7	5.1
26/06/2015	15.8	13.3	9.3	4.9	10.0	0.9	1.2	1.8	1.3	1.6
27/06/2015	19.4	9.8	17.2	4.5	9.4	7.0	6.6	1.8	6.0	-
28/06/2015	18.2	11.4	17.2	7.8	10.1	1.1	1.5	1.5	2.0	-
29/06/2015	18.8	12.0	13.7	6.5	11.9	1.5	0.8	1.2	1.0	-
30/06/2015	15.7	9.3	12.4	5.6	11.9	3.0	2.1	2.1	4.7	-
1/07/2015	16.5	10.2	11.5	5.9	12.0	4.0	0.6	1.7	4.0	7.5
2/07/2015	9.8	8.2	6.1	3.5	6.1	-1.0	0.1	1.3	8.4	5.2
3/07/2015	18.6	13.6	10.6	4.4	6.8	7.2	0.0	1.9	3.8	7.3
4/07/2015	19.1	8.5	15.5	6.2	6.6	0.2	0.6	0.8	1.2	3.7
5/07/2015	19.0	10.8	20.1	6.4	8.5	-0.6	0.9	2.2	0.5	6.9
6/07/2015	14.6	10.5	9.3	5.8	5.7	-1.7	0.4	1.5	-	4.9
7/07/2015	11.3	9.1	6.0	4.5	5.1	7.2	0.4	1.0	-	7.0
8/07/2015	10.8	9.3	6.0	4.7	6.5	-	0.0	-	1.6	5.1
9/07/2015	14.5	8.2	12.0	3.4	8.2	-	0.1	1.7	0.4	5.2
10/07/2015	12.7	10.7	9.6	5.1	7.7	0.2	3.0	0.9	4.4	5.5
11/07/2015	7.8	7.5	5.2	3.8	7.9	5.6	1.1	2.0	4.6	8.0
12/07/2015	5.7	3.1	2.5	1.6	3.7	-0.2	0.0	1.8	-	5.7
13/07/2015	6.0	4.6	3.0	2.6	3.3	-3.0	0.5	1.7	-	5.1
14/07/2015	6.7	5.9	3.0	2.0	3.6	-3.0	0.5	0.8	0.4	6.1
15/07/2015	10.6	12.6	6.2	5.5	6.8	0.8	0.7	2.6	8.2	7.0
16/07/2015	7.8	8.8	6.3	3.7	5.3	11.0	0.6	1.5	2.2	4.6
17/07/2015	5.1	4.7	1.9	2.7	3.1	1.0	0.0	0.8	-	5.8
18/07/2015	9.7	9.5	4.5	4.2	6.3	10.0	0.0	-	3.5	5.0
19/07/2015	11.8	11.2	7.1	3.3	5.6	9.1	0.0	2.5	3.3	5.7
20/07/2015	11.0	9.5	6.2	5.1	6.3	-0.8	0.9	3.1	-	6.5
21/07/2015	11.6	8.1	7.6	4.1	8.6	3.4	5.3	2.4	2.7	14.1
22/07/2015	17.8	9.9	10.5	5.5	9.6	3.9	2.7	0.9	2.7	6.7
23/07/2015	14.7	8.2	11.9	4.4	7.2	7.2	1.2	-	3.4	6.7
24/07/2015	10.6	7.3	7.9	4.3	9.2	5.7	1.2	1.3	5.6	6.6
25/07/2015	8.9	7.4	4.8	5.3	5.9	0.1	0.4	1.5	-	4.7
26/07/2015	9.3	6.7	3.0	3.9	4.8	-1.7	0.4	1.3	-	5.4
27/07/2015	9.1	8.6	3.4	3.6	4.8	-2.3	0.1	1.3	7.2	5.4
28/07/2015	14.9	11.5	9.1	3.8	6.5	1.5	0.0	1.8	-	7.1
29/07/2015	18.7	15.1	12.2	4.0	12.4	4.3	0.1	2.7	-	5.9
30/07/2015	19.4	9.9	12.6	4.8	17.7	6.2	0.6	2.6	4.5	7.0
31/07/2015	18.3	15.7	8.5	5.7	11.9	4.0	0.2	1.4	7.3	3.4
1/08/2015	18.9	11.0	11.4	5.8	12.7	3.9	0.0	3.8	6.1	3.5
2/08/2015	20.9	11.7	6.9	7.5	11.8	5.4	0.5	3.4	6.5	7.9
3/08/2015	13.7	11.5	4.6	2.8	8.4	-1.7	0.1	0.9	-	5.1
4/08/2015	9.4	10.1	4.9	4.6	8.4	7.9	0.1	0.7	9.9	4.5
5/08/2015	10.4	9.0	4.2	1.4	6.2	-2.1	0.1	-	-	3.7
6/08/2015	-	10.2	-	3.5	6.4	2.8	0.0	2.5	3.7	3.7
7/08/2015	-	14.0	-	5.4	6.9	1.7	0.1	4.0	0.9	4.3
8/08/2015	18.4	12.7	11.4	5.4	19.1	2.7	0.2	2.2	1.5	5.5
9/08/2015	16.8	12.7	12.5	5.7	12.2	2.4	1.2	9.7	1.6	6.1
10/08/2015	-	18.3	8.2	6.6	10.4	1.4	0.1	4.3	0.9	2.5
11/08/2015	-	19.9	12.8	6.4	9.3	3.3	0.6	3.9	4.1	5.2
12/08/2015	21.8	19.4	15.0	2.8	7.0	0.8	1.9	3.2	-	2.5
13/08/2015	8.2	12.0	3.6	3.3	5.6	0.2	0.0	3.6	8.3	7.8
14/08/2015	15.9	17.6	7.4	5.4	11.5	0.3	0.2	4.0	7.7	7.6
15/08/2015	17.3	14.3	13.0	8.2	19.6	7.6	0.0	3.6	1.1	3.8
16/08/2015	15.3	13.5	12.1	7.9	14.3	1.1	4.2	3.8	1.5	7.2

Date	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)			SO ₂ (µg/m ³)				
	Wallsend	Wyong	Wallsend	Wyong	Wyee	Wallsend	Wyong	Dora Creek	Marks Point	Wyee
17/08/2015	14.0	11.3	7.6	4.1	10.3	1.5	1.5	3.2	1.3	4.3
18/08/2015	14.2	-	9.4	-	7.1	1.5	0.3	8.6	-	4.9
19/08/2015	21.0	-	12.6	-	10.7	3.6	0.7	3.5	-	9.9
20/08/2015	17.9	19.7	11.0	8.4	13.3	3.4	5.3	2.9	-	15.0
21/08/2015	25.4	25.2	16.6	11.7	23.7	4.8	3.4	5.0	2.8	6.9
22/08/2015	35.3	19.3	24.0	8.8	24.6	2.5	0.9	11.6	6.6	8.6
23/08/2015	17.3	11.2	16.3	6.5	13.6	1.9	1.4	-	2.5	4.0
24/08/2015	8.1	8.3	4.3	7.1	8.8	2.5	0.6	4.2	1.5	6.0
25/08/2015	7.0	5.3	3.7	2.7	8.1	-2.3	0.2	1.6	-	7.0
26/08/2015	7.9	8.3	3.2	2.9	9.8	5.5	0.1	1.1	-	5.0
27/08/2015	8.7	4.5	3.5	2.0	8.0	-	0.0	3.8	2.5	6.7
28/08/2015	8.1	7.5	4.7	3.2	5.8	-1.9	0.0	2.7	-	5.1
29/08/2015	9.9	8.1	5.5	2.6	7.3	4.3	-	2.6	0.9	7.5
30/08/2015	11.1	8.9	6.2	3.1	7.8	1.0	-	5.0	-	6.2
31/08/2015	12.4	9.7	6.8	4.6	9.2	3.1	-	2.0	2.8	6.0
1/09/2015	15.1	11.3	6.8	5.3	10.7	-0.3	0.0	-	3.8	2.3
2/09/2015	14.6	15.4	5.9	4.9	10.2	3.3	4.1	6.6	-	6.5
3/09/2015	8.2	8.5	5.7	5.7	7.6	-0.2	0.2	-	2.6	3.3
4/09/2015	14.9	14.5	5.5	6.1	8.0	8.3	0.0	1.3	-	3.1
5/09/2015	12.1	10.4	7.2	5.0	7.4	2.2	0.0	4.0	-	3.0
6/09/2015	9.6	10.1	5.6	4.7	10.3	1.6	0.0	2.1	0.4	7.8
7/09/2015	12.3	7.8	5.8	3.0	7.7	6.3	0.6	2.9	1.9	5.2
8/09/2015	9.4	10.7	4.4	3.2	4.2	-0.7	0.3	3.2	5.4	4.1
9/09/2015	13.1	10.4	4.5	3.8	5.8	2.2	0.0	5.4	3.4	3.2
10/09/2015	13.4	12.7	7.0	4.5	8.7	3.8	0.0	2.5	0.7	1.7
11/09/2015	13.8	14.7	6.5	4.0	9.9	0.8	5.7	3.3	1.0	8.2
12/09/2015	18.2	14.5	9.5	6.7	15.0	6.2	2.2	3.2	2.6	6.5
13/09/2015	17.6	14.7	11.4	8.6	26.3	2.7	1.7	2.4	0.8	8.1
14/09/2015	14.9	17.6	6.3	5.8	11.8	5.6	5.2	3.6	1.7	12.0
15/09/2015	23.4	14.9	7.1	4.7	10.7	1.8	0.4	7.5	5.0	4.8
16/09/2015	13.0	21.6	6.0	7.0	7.1	4.2	0.0	7.3	-	4.0
17/09/2015	18.1	13.3	9.7	4.9	7.8	-0.7	0.0	2.6	1.0	3.2
18/09/2015	13.4	13.2	6.1	4.1	8.1	-0.3	0.0	1.4	-	3.8
19/09/2015	7.5	8.1	2.1	2.9	6.8	-0.3	0.0	2.6	-	2.9
20/09/2015	8.5	6.3	2.8	1.7	6.4	0.1	0.0	2.4	-	3.8
21/09/2015	12.6	8.7	4.6	4.2	8.4	4.2	4.2	7.1	-	5.6
22/09/2015	13.6	12.2	6.9	4.8	8.2	2.1	0.1	1.1	1.1	2.2
23/09/2015	10.3	11.5	3.7	2.5	5.2	6.2	0.0	1.7	-	3.9
24/09/2015	8.2	9.4	3.0	2.6	4.7	8.4	0.0	0.6	-	4.0
25/09/2015	9.0	10.3	2.7	3.4	6.1	10.6	0.0	1.2	-	1.4
26/09/2015	8.5	8.6	2.9	3.4	5.9	2.5	0.0	-	-	2.8
27/09/2015	9.3	10.2	4.1	2.9	6.4	1.9	0.0	0.6	-	2.6
28/09/2015	12.0	13.0	4.9	3.9	6.6	0.2	0.0	1.3	1.0	3.7
29/09/2015	17.9	19.3	5.6	6.4	11.0	3.2	9.2	5.2	-	16.2
30/09/2015	26.5	26.6	9.8	8.8	11.4	4.1	0.4	3.4	1.3	4.7
1/10/2015	24.2	24.8	10.4	9.7	11.5	7.6	2.3	3.9	0.7	3.1
2/10/2015	19.8	22.9	9.2	7.0	13.1	1.7	1.0	1.2	0.9	3.2
3/10/2015	21.8	20.7	10.2	9.1	13.4	19.4	5.8	7.6	10.4	3.3
4/10/2015	21.7	13.7	9.6	4.5	9.7	-0.2	0.0	-	2.6	-1.7
5/10/2015	24.9	16.5	9.8	7.0	10.2	0.7	3.0	4.2	2.8	3.6
6/10/2015	29.4	34.4	10.5	9.0	13.2	1.3	5.6	4.9	-	3.4
7/10/2015	33.1	32.6	14.2	10.8	14.0	-0.6	0.1	1.5	0.9	-1.4
8/10/2015	25.5	28.7	5.3	5.9	8.6	-0.1	0.4	1.6	0.4	2.5
9/10/2015	19.9	27.1	6.3	6.3	7.7	0.8	3.1	11.8	0.5	2.6
10/10/2015	21.8	20.3	9.1	7.9	13.1	8.5	2.2	9.8	1.7	10.6
11/10/2015	19.8	19.3	10.0	9.6	17.9	12.5	7.0	-	3.7	7.7
12/10/2015	19.4	18.1	7.2	6.4	11.2	8.0	1.6	-	1.9	1.9

Date	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)			SO ₂ (µg/m ³)				
	Wallsend	Wyong	Wallsend	Wyong	Wyee	Wallsend	Wyong	Dora Creek	Marks Point	Wyee
13/10/2015	20.0	18.3	8.5	8.1	11.1	3.0	0.0	1.9	0.5	0.2
14/10/2015	16.3	14.7	5.9	6.3	12.1	0.5	1.1	5.3	0.3	0.8
15/10/2015	17.2	17.2	5.2	6.0	12.7	2.2	9.0	7.0	1.4	7.8
16/10/2015	22.5	19.9	7.7	7.5	15.3	7.7	6.4	2.6	3.5	5.7
17/10/2015	26.5	36.8	12.2	10.4	14.0	5.1	0.6	5.2	-	2.6
18/10/2015	22.9	23.4	7.3	6.6	12.9	0.2	0.0	10.5	0.4	-1.3
19/10/2015	16.6	15.4	6.7	5.1	11.5	3.0	1.1	3.3	-	1.4
20/10/2015	21.7	25.4	5.9	6.7	14.6	-0.9	3.8	4.1	1.4	4.8
21/10/2015	25.3	22.8	9.2	7.1	12.3	6.8	2.7	4.5	2.0	2.1
22/10/2015	10.0	9.3	5.4	3.9	11.6	1.9	0.2	5.2	2.8	3.9
23/10/2015	14.6	14.2	5.1	4.1	9.3	13.9	0.0	0.5	1.3	0.1
24/10/2015	11.5	11.1	3.4	3.1	5.8	1.6	4.2	1.6	-	6.9
25/10/2015	14.2	15.4	5.9	4.8	8.8	1.5	6.7	7.2	3.2	3.8
26/10/2015	17.5	25.8	5.1	5.3	9.0	4.7	1.6	-	4.4	-0.8
27/10/2015	17.1	15.3	6.2	5.8	8.0	-1.1	0.0	-	0.8	-0.8
28/10/2015	15.6	16.0	3.5	3.9	7.0	-0.2	0.0	1.2	0.7	4.4
29/10/2015	17.4	17.6	4.9	4.2	6.7	6.2	0.2	1.3	0.3	14.3
30/10/2015	15.3	16.9	4.5	4.1	10.9	1.0	2.5	1.9	0.4	-1.3
31/10/2015	11.5	15.1	5.3	6.4	14.2	3.5	6.8	8.3	0.4	2.4
1/11/2015	13.6	16.0	6.3	5.3	16.1	1.1	4.4	6.1	0.8	1.4
2/11/2015	15.4	16.3	7.0	7.9	14.5	7.3	5.7	1.2	0.4	0.0
3/11/2015	13.1	9.3	6.4	3.5	11.4	-0.7	0.0	2.1	-	-0.1
4/11/2015	9.4	8.2	4.9	3.2	7.9	7.4	0.0	1.4	0.5	0.7
5/11/2015	7.0	11.9	-	3.5	9.7	0.5	4.5	5.3	-	-0.3
6/11/2015	11.6	10.7	5.7	2.8	8.6	3.6	0.2	-	3.9	0.1
7/11/2015	14.2	13.5	4.8	3.6	12.5	0.1	0.0	3.1	0.2	0.6
8/11/2015	12.8	14.6	3.5	3.2	10.3	0.8	0.0	1.7	-	0.6
9/11/2015	12.6	12.1	3.5	3.8	8.4	0.1	0.0	3.9	-	5.9
10/11/2015	15.1	13.2	3.6	5.1	7.5	2.6	6.5	3.5	3.3	14.4
11/11/2015	9.8	11.6	5.1	4.5	8.3	0.9	0.1	1.5	1.9	7.1
12/11/2015	11.1	13.2	3.6	3.8	12.5	2.4	5.2	8.5	1.2	0.7
13/11/2015	12.5	12.2	4.5	5.3	9.4	3.3	1.0	3.1	3.6	1.1
14/11/2015	11.5	11.6	5.5	3.5	8.3	0.1	0.6	4.3	1.2	0.1
15/11/2015	11.2	10.4	3.2	3.9	7.5	0.6	0.0	4.9	0.5	0.0
16/11/2015	8.1	10.1	-	2.9	7.3	0.4	0.0	3.3	0.5	0.4
17/11/2015	12.6	11.4	3.6	3.0	7.7	1.1	7.5	-	5.5	1.6
18/11/2015	18.7	16.3	3.8	4.2	14.3	2.6	0.0	-	1.6	-0.1
19/11/2015	-	33.1	14.5	9.7	13.3	3.8	2.0	4.1	2.3	0.0
20/11/2015	-	24.9	11.2	13.1	19.9	4.2	0.5	-	1.8	2.0
21/11/2015	25.5	25.9	10.5	7.3	11.4	0.1	0.0	6.7	-	-2.2
22/11/2015	23.5	17.9	5.2	7.0	10.6	3.7	0.0	1.7	1.2	1.3
23/11/2015	26.0	25.1	7.9	8.5	11.7	2.9	0.6	9.5	2.0	1.4
24/11/2015	22.9	22.8	7.4	6.1	12.2	2.4	2.5	2.5	1.5	1.4
25/11/2015	28.0	32.9	10.7	9.1	17.4	8.9	6.7	6.9	5.0	4.2
26/11/2015	43.4	41.7	9.8	8.3	19.2	0.2	0.6	-	3.5	2.7
27/11/2015	41.2	33.7	9.4	7.9	10.7	1.2	0.4	1.9	1.5	0.1
28/11/2015	27.3	25.4	6.5	6.8	9.3	1.5	0.6	5.5	1.6	1.4
29/11/2015	19.2	25.0	5.5	8.5	8.5	0.2	4.2	5.4	0.7	-0.6
30/11/2015	22.3	18.0	9.2	5.2	12.6	-	0.2	7.2	1.0	10.5
1/12/2015	21.2	20.4	7.6	7.8	14.5	2.4	5.6	5.4	4.1	6.0
2/12/2015	28.8	29.1	8.1	7.4	8.6	-	0.0	1.8	-	2.1
3/12/2015	20.5	25.5	6.1	6.4	10.0	-	0.1	2.7	-	3.1
4/12/2015	14.9	12.5	4.8	2.7	6.5	2.9	0.0	1.7	1.1	6.0
5/12/2015	17.2	11.8	4.5	3.4	5.5	3.5	1.2	1.3	1.4	6.5
6/12/2015	17.2	12.4	5.9	4.0	9.1	5.2	0.6	2.3	1.7	35.2
7/12/2015	14.5	11.5	3.9	1.9	7.6	0.2	0.0	1.5	1.1	12.6
8/12/2015	22.6	21.6	6.9	5.6	9.8	4.1	26.8	2.9	1.4	18.8

Date	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)			SO ₂ (µg/m ³)				
	Wallsend	Wyong	Wallsend	Wyong	Wyee	Wallsend	Wyong	Dora Creek	Marks Point	Wyee
9/12/2015	19.4	23.4	9.3	-	9.5	6.6	-	-	2.3	5.1
10/12/2015	-	23.9	-	8.1	11.3	5.7	6.7	-	1.5	2.9
11/12/2015	-	25.5	-	9.1	14.0	-3.4	1.2	3.5	6.5	3.4
12/12/2015	36.4	32.9	11.4	9.0	8.4	-0.2	0.0	4.5	-	4.2
13/12/2015	27.0	24.1	6.8	7.7	8.5	3.4	0.9	4.8	1.5	3.0
14/12/2015	33.0	24.4	9.1	10.4	14.0	6.5	3.6	5.1	3.0	16.8
15/12/2015	28.1	21.9	7.0	6.5	11.3	-	1.6	3.1	0.9	11.0
16/12/2015	16.6	14.5	9.5	6.2	10.0	-1.8	-	2.7	0.8	3.3
17/12/2015	13.7	12.6	5.3	4.7	8.5	1.6	-	1.3	1.4	14.5
18/12/2015	22.6	15.1	12.3	5.3	11.7	1.6	7.0	4.3	3.2	8.3
19/12/2015	31.9	18.2	21.9	8.9	16.8	2.0	2.6	4.3	2.0	5.3
20/12/2015	27.0	27.5	21.9	10.6	21.3	2.0	4.1	5.6	2.2	4.8
21/12/2015	27.9	26.8	14.5	8.5	13.8	2.6	0.0	10.5	2.0	2.9
22/12/2015	11.3	10.4	6.6	2.8	10.5	0.1	0.0	2.1	0.3	2.7
23/12/2015	14.5	15.6	4.5	3.8	11.4	0.0	0.1	1.5	0.6	3.1
24/12/2015	18.0	15.2	10.6	4.8	7.5	-1.2	0.0	2.2	0.8	2.8
25/12/2015	11.5	12.0	-	5.7	7.2	0.1	0.1	2.0	1.2	14.2
26/12/2015	10.8	11.7	-	4.4	11.1	-0.5	7.4	3.6	3.2	10.7
27/12/2015	22.6	19.3	9.4	5.5	10.8	-0.2	0.0	1.0	-	2.9
28/12/2015	15.2	12.9	9.1	3.7	7.1	0.6	0.0	-	-	2.9
29/12/2015	12.3	11.0	4.0	3.5	5.2	0.5	0.0	4.1	0.4	3.5
30/12/2015	9.5	9.2	5.9	3.4	6.7	-0.5	0.0	8.8	0.8	2.6
31/12/2015	15.8	13.5	5.6	3.9	8.4	1.7	0.2	1.0	1.2	16.3

- Not applicable

Table C-2: 24-hour average HVAS monitoring data

Date	PM ₁₀ (HVAS) (µg/m ³)		Date	PM ₁₀ (HVAS) (µg/m ³)	
	Wakefield (Westside)	Teralba		Wakefield (Westside)	Teralba
5/01/2015	12.4	19.0	10/07/2015	10.9	13.0
11/01/2015	9.2	6.0	16/07/2015	6.2	9.0
17/01/2015	14.6	15.0	22/07/2015	12.8	10.0
23/01/2015	12.4	15.0	28/07/2015	7.5	2.0
29/01/2015	8.3	17.0	3/08/2015	9.5	3.0
4/02/2015	12.6	14.0	9/08/2015	10.8	13.0
10/02/2015	10.4	10.0	15/08/2015	32.3	50.0
16/02/2015	14.4	19.0	21/08/2015	27.7	36.0
22/02/2015	7.9	7.0	27/08/2015	6.5	5.0
28/02/2015	13.1	14.0	2/09/2015	11.2	16.0
6/03/2015	17.5	25.0	8/09/2015	10.9	8.0
12/03/2015	21.7	25.0	14/09/2015	18.1	14.0
18/03/2015	17.9	23.0	20/09/2015	13.9	5.0
24/03/2015	14.5	15.0	26/09/2015	-	5.0
30/03/2015	9.2	10.0	2/10/2015	10.9	26.0
5/04/2015	8.2	7.0	8/10/2015	28.5	23.0
11/04/2015	8.9	4.0	14/10/2015	19.3	20.0
17/04/2015	17.6	15.0	20/10/2015	23.9	28.0
23/04/2015	-	6.0	26/10/2015	19.1	20.0
29/04/2015	8.5	5.0	1/11/2015	35.1	18.0
5/05/2015	11.1	14.0	7/11/2015	12.9	1.0
11/05/2015	8.5	11.0	13/11/2015	12.0	6.0
17/05/2015	8.4	7.0	19/11/2015	33.0	36.0
23/05/2015	10.6	14.0	25/11/2015	21.1	27.0
29/05/2015	7.4	3.0	1/12/2015	19.2	30.0
4/06/2015	9.3	13.0	7/12/2015	10.5	9.0
10/06/2015	8.5	8.0	13/12/2015	21.0	21.0
16/06/2015	6.8	8.0	19/12/2015	21.0	34.0
22/06/2015	10.2	8.0	25/12/2015	8.0	10.0
28/06/2015	13.9	20.0	31/12/2015	8.0	7.0
4/07/2015	11.8	12.0	-	-	-

- Not applicable