REVIEW OF NAMOI AMBIENT AIR QUALITY DATA SUMMER 2016/17

NSW Environment Protection Authority

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REVIEW OF NAMOI

AMBIENT AIR QUALITY DATA

SUMMER 2016/17

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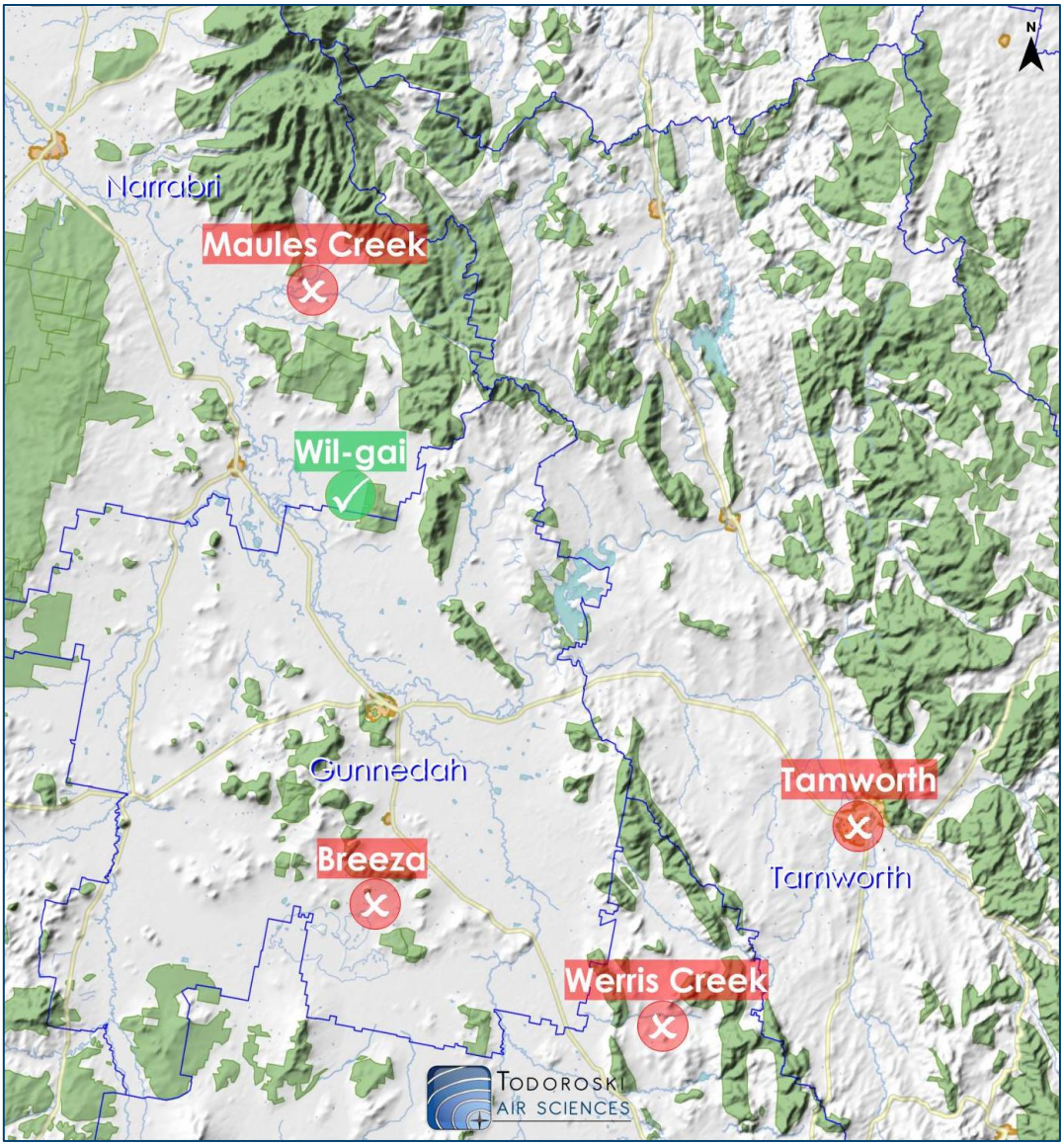
EXECUTIVE SUMMARY

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 Namoi region for the summer 2016/17 period.

The results indicate that the air quality was generally good in the Namoi region in summer 2016/17. The data show that all of the Namoi monitors recorded at least one day with PM_{10} or $PM_{2.5}$ levels above the relevant criteria on 12 or 13 February 2017 (except the Wil-gai monitor which was not operating during this period). Analysis of the data indicate that a bushfire to the south-southwest of the Namoi region was the cause of the elevated particulate levels during this period. 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.

Namoi Air Quality Pictorial Summary – Summer 2016/17



Namoi Air Quality Tabular Summary – Summer 2016/17

Site	PM_{10}	$PM_{2.5}$
	Maximum 24-hour average	
	Air Quality Impact Criteria (µg/m³)	
	50	25
Breeza	✓	✗
Maules Creek	✗	✗
Werris Creek	✓	✗
Wil-gai	✓	✓
Tamworth	✗	✓

✓ - All data below applicable criteria ✗ - At least one elevated level above applicable criteria

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 Namoi region in summer 2016/17.

2 PROJECT SCOPE

The following outlines the scope of work for this project.

- Provide three reports for the Namoi region which cover the periods July 2015 to December 2016, summer (December 2016 to February 2017) and autumn (March 2017 to May 2017). The reports will examine compliance with 24-hour hour average and annual average criteria, summarise all of the reported data and include seasonal trends and 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 Tamworth, and by industry at Breeza, Maules Creek, Werris Creek and Wil-gai.
- 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 with 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 generally 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 PM_{10} and $PM_{2.5}$, it is noted that all data must be published, however days with exceptional events (e.g. bushfires and dust storms) may be excluded for the purpose of assessing compliance with the national standards.

Data from industry monitoring sites can be compared with NSW EPA impact assessment criteria, and Project Approval criteria. Where the levels measured at industry monitoring sites are above the applicable impact assessment or Project Approval 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 NSW EPA website provides ambient air quality monitoring data on a weekly basis for four industry operated monitoring locations in the Namoi region, at Breeza, Maules Creek, Werris Creek and Wil-gai.
    - http://www.epa.nsw.gov.au/air/namoi/namoiairmon.htm
- 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.
    - http://www.environment.nsw.gov.au/AQMS/aboutaqi.htm
- The NSW OEH website air quality page provides hourly updates of the AQI and data readings from the NSW EPA monitoring sites. Subscribers can sign up for alerts for elevated levels for the North-west slopes, based on the Tamworth monitoring site.
    - http://www.environment.nsw.gov.au/aqms/subscribe.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.
    - http://aqicn.org/map/world/
- The NSW Health website provides information on how air pollution affects health and steps for reducing your air pollution and limiting your exposure.
    - 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 Namoi region in summer 2016/17.

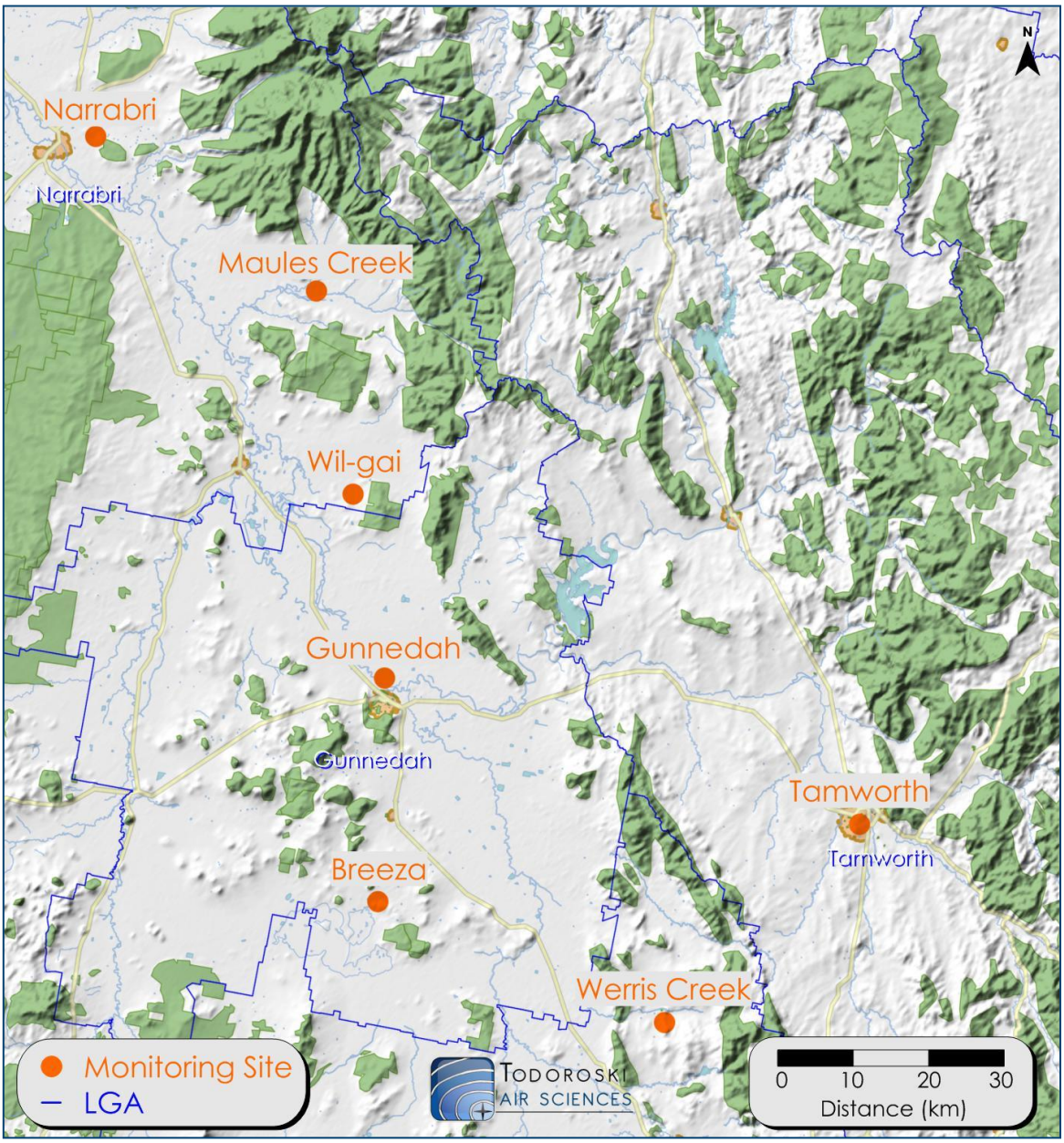


Figure 4-1: Monitoring site locations

Table 4-1: Monitoring sites

Monitoring Station	Type	Recorded Parameters	Recording Periods
Tamworth	NSW OEH site	PM_{10} (TEOM), $PM_{2.5}$ (BAM), WS, WD	Hourly/Daily
Breeza	Industry site	PM_{10} (TEOM), $PM_{2.5}$ (TEOM), WS[1], WD[1]	Hourly/Daily
Maules Creek	Industry site	PM_{10} (TEOM), $PM_{2.5}$ (TEOM), WS[1], WD[1]	Hourly/Daily
Werris Creek	Industry site	PM_{10} (TEOM), $PM_{2.5}$ (TEOM), WS, WD	Hourly/Daily
Wil-gai	Industry site	PM_{10} (TEOM), $PM_{2.5}$ (TEOM), WS, WD	Hourly/Daily
Gunnedah	BOM weather station	WS, WD	Hourly
Narrabri	BOM weather station	WS, WD	Hourly

PM_{10} - Particulate matter < 10µm
$PM_{2.5}$ - Particulate matter < 2.5µm
BOM - Bureau of Meteorology
TEOM - Tapered Element Oscillating Microbalance
BAM - Beta Attenuation Monitor
[1] Sensor not at 10m above ground level
WS - Wind speed
WD - Wind direction

5 AIR QUALITY CRITERIA

The sections below identify the key pollutants currently being monitored at the Namoi 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 50µm 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 10µm or less, and $PM_{2.5}$, particulate matter with aerodynamic diameters of 2.5µm 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 New South Wales* (**NSW EPA, 2017**).

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

Pollutant	Averaging Period	Criterion
Total suspended particulates (TSP)	Annual	90µg/m^3
Particulate Matter < 10µm (PM_{10})	Annual	25µg/m^3
	24-hour	50µg/m^3
Particulate Matter < 2.5µm ($PM_{2.5}$)	Annual	8µg/m^3
	24-hour	25µg/m^3

Source: **NSW EPA, 2017**

5.2 Summary of applicable criteria for this review

The particulate pollutants monitored in the Namoi region have air quality criteria which are averaged over short and long time periods.

As this report looks at less than an annual period of ambient air quality data, only the criteria applicable averaged over the shorter time periods (24-hours) are applicable.

Table 5-2 summarises the applicable air quality criteria for this review.

Table 5-2: Air quality criteria used in this review

Pollutant	Averaging Period	Type	Concentration
Particulate Matter < 10µm (PM_{10})	24-hour	Criterion / NEPM Standard[1]	50µg/m^3
Particulate Matter < 2.5µm ($PM_{2.5}$)	24-hour	Criterion/ NEPM Standard[1]	25µg/m^3

[1] Source: **NEPC, 2016**

6 METEOROLOGICAL MONITORING DATA

Representative wind speed and direction data have been obtained from the relevant monitoring stations listed in **Table 4-1.**

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

Figure 6-1 presents the 2017 summer seasonal windroses for Tamworth, Werris Creek, Wil-gai, Gunnedah and Narrabri.

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

The meteorological stations generally recorded winds from the southeast quadrant during summer. The Narrabri station also frequently recorded northerly winds, and the Wil-gai station generally recorded winds along an east-southeast to west-northwest axis. The recorded wind speeds were generally higher at the Narrabri and Gunnedah (airport) weather stations than at the other sites. This is likely due to the clear open spaces and flat terrain which are characteristic of both sites. The Tamworth weather station generally recorded much lower wind speeds which is likely due to the siting of the station amongst buildings and vegetation within the township of Tamworth.

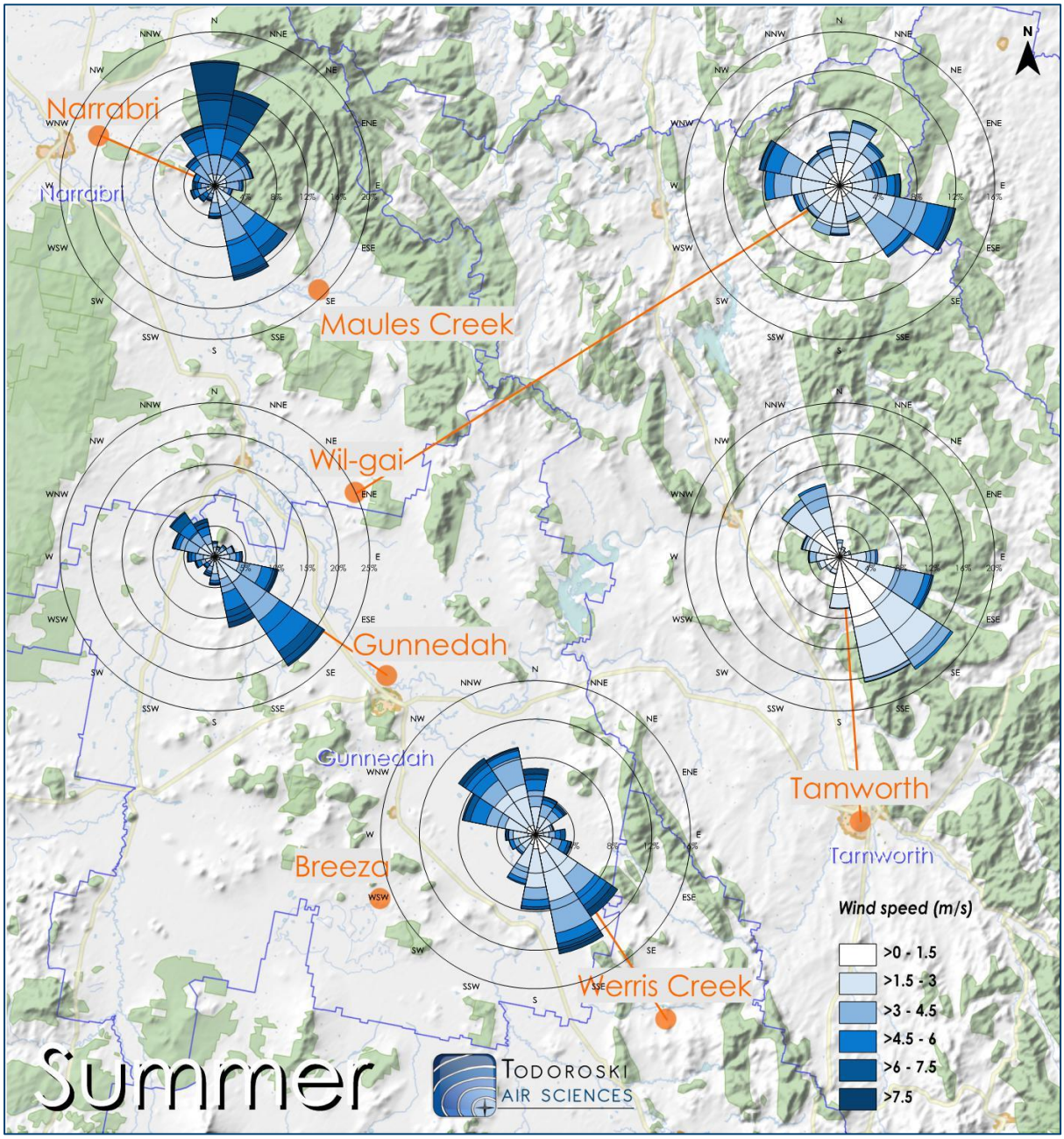


Figure 6-1: Summer 2017 windroses - Tamworth, Werris Creek, Wil-gai, Gunnedah and Narrabri

The windroses show that the meteorological stations recorded winds which were generally from the southeast quadrant, however the winds varied depending on the local influence of environmental features such as terrain, vegetation and buildings. The Narrabri station also frequently recorded northerly winds.

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 1-hour average readings. Only data labelled as valid have been included in the averages. Days which contain less than 75% valid data (less than 18 hours of 1-hour average data) have not been included in this report.

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 rolling 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**.

7.2 Analysis of Monitoring Data

Table 7-1 presents a summary of the pollutant levels measured during summer 2016/17. The results indicate that the Maules Creek and Tamworth monitors recorded 24-hour average PM_{10} levels above the criterion of 50µg/m^3 and the Breeza, Maules Creek and Werris Creek monitors recorded 24-hour average $PM_{2.5}$ levels above the criteria of 25µg/m^3. All other pollutant levels were below the applicable criteria.

Figure 7-1 presents a summary of the PM_{10} and $PM_{2.5}$ AQI levels recorded in the Namoi region during summer 2016/17. The data indicate that the air quality was generally very good in the Namoi region during this period.

Table 7-1: Maximum and annual average pollutant levels – Summer 2016/17

Site	PM_{10}	$PM_{2.5}$
	Maximum 24-hour average	
	Air Quality Impact Criteria (µg/m^3)	
	50	25
Breeza	47.9	**39.2**
Maules Creek	**52.5**	**34.3**
Werris Creek	47.1	**36.4**
Wil-gai	39.9	13.9
Tamworth	**50.9**	21.5

7.3 PM_{10}

Figure 7-2 presents all of the 24-hour average PM_{10} monitoring results recorded in the Namoi region during summer 2016/17.

Relative to the Air Quality Index, as shown by the coloured bands in the figure, PM_{10} levels were generally very good or good during summer 2016/17. The Breeza and Werris Creek monitors recorded fair levels on two days, and the Wil-gai and Tamworth monitors recorded one day with fair levels. The Tamworth and Maules Creek monitors both recorded one day with poor levels

The Maules Creek and Tamworth monitors recorded one day each with elevated PM_{10} levels above the 24-hour average criterion of 50µg/m^3. All other 24-hour average data were below the criterion in summer 2016/17.

Figure B-1 to **Figure B-5** in **Appendix B** present the 1-hour average, 24-hour average and rolling annual average PM_{10} data in graphical form for each individual site. The rolling annual averages are based on the previous 12-month periods of data. There is no criterion that applies to 1-hour average PM_{10} levels and these 1-hour results are not intended to be compared with the PM_{10} criterion. It is a normal occurrence, and it is expected that in the normal environment 1-hour average PM_{10} levels will fluctuate more significantly than 24-hour average PM_{10} levels.

We note the monitoring sites on occasion recorded periods in which PM_{10} 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 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).

7.4 $PM_{2.5}$

Figure 7-3 presents all of the 24-hour average $PM_{2.5}$ monitoring data recorded in the Namoi region during summer 2016/17.

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 during summer 2016/17. The Breeza and Tamworth monitors recorded five days and one day with fair levels respectively. The Werris Creek and Maules Creek monitors recorded poor levels on two days and one day respectively, and the Breeza monitor recorded one day with very poor levels.

On 12 and 13 February 2017 the Breeza, Maules Creek and Werris Creek monitors recorded at least one day with 24-hour average $PM_{2.5}$ levels over the criterion of 25µg/m^3. All other 24-hour average data recorded at the Namoi monitoring sites were below the criterion in summer 2016/17.

Figure B-6 to **Figure B-10** in **Appendix B** present the 1-hour average, 24-hour average and rolling annual average $PM_{2.5}$ data in graphical form for each individual site. The rolling annual averages are based on the previous 12-month periods of data. 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 $PM_{2.5}$ criteria. 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 monitoring 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 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).

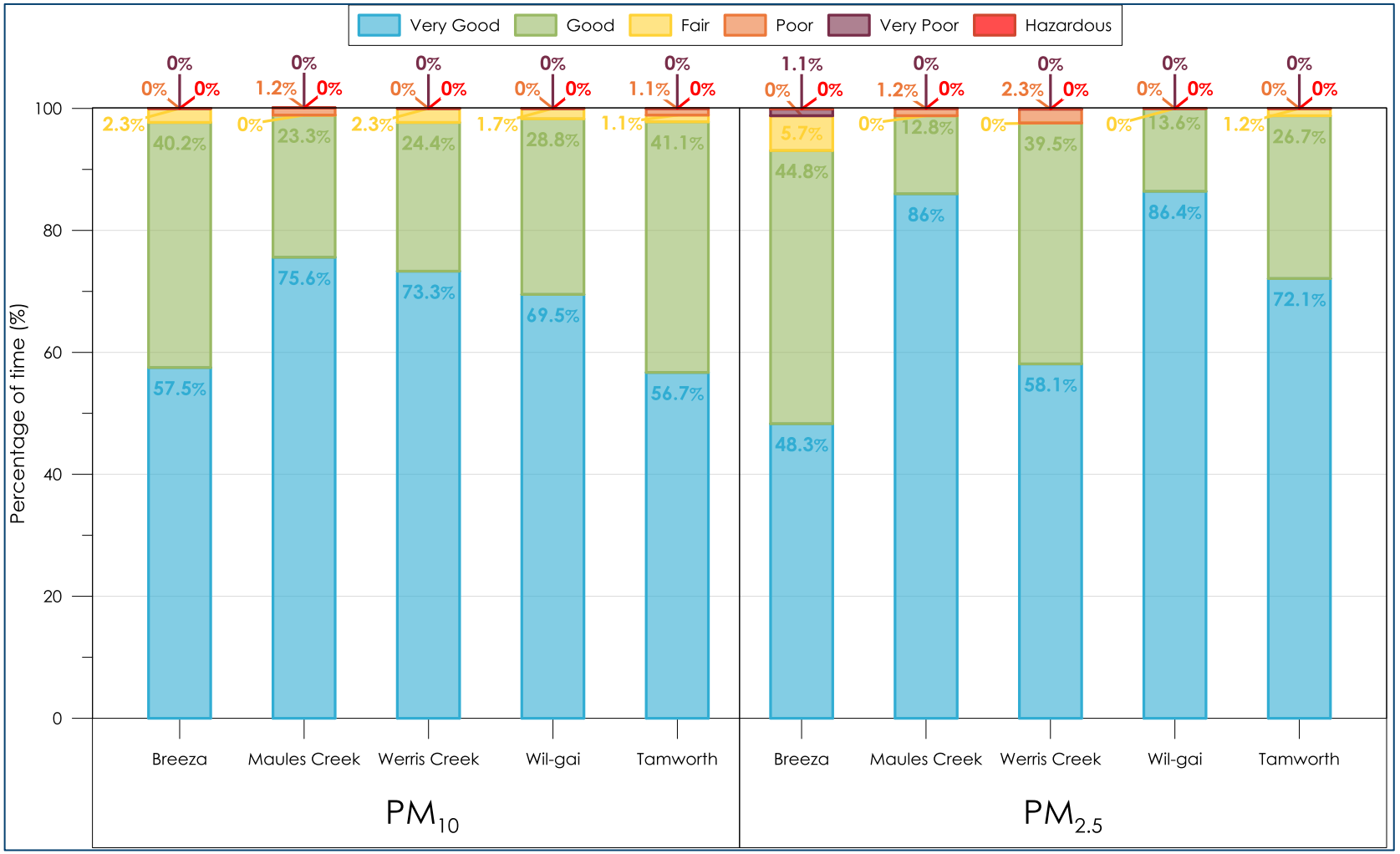


Figure 7-1: Summary of AQI levels recorded in the Namoi region during summer 2016/17

The data indicate that PM_{10} levels in the Namoi region were very good between 57.5% (Breeza) and 75.6% (Maules Creek) of the time, and $PM_{2.5}$ levels were very good between 48.3% (Breeza) and 86.4% (Wil-gai) of the time.

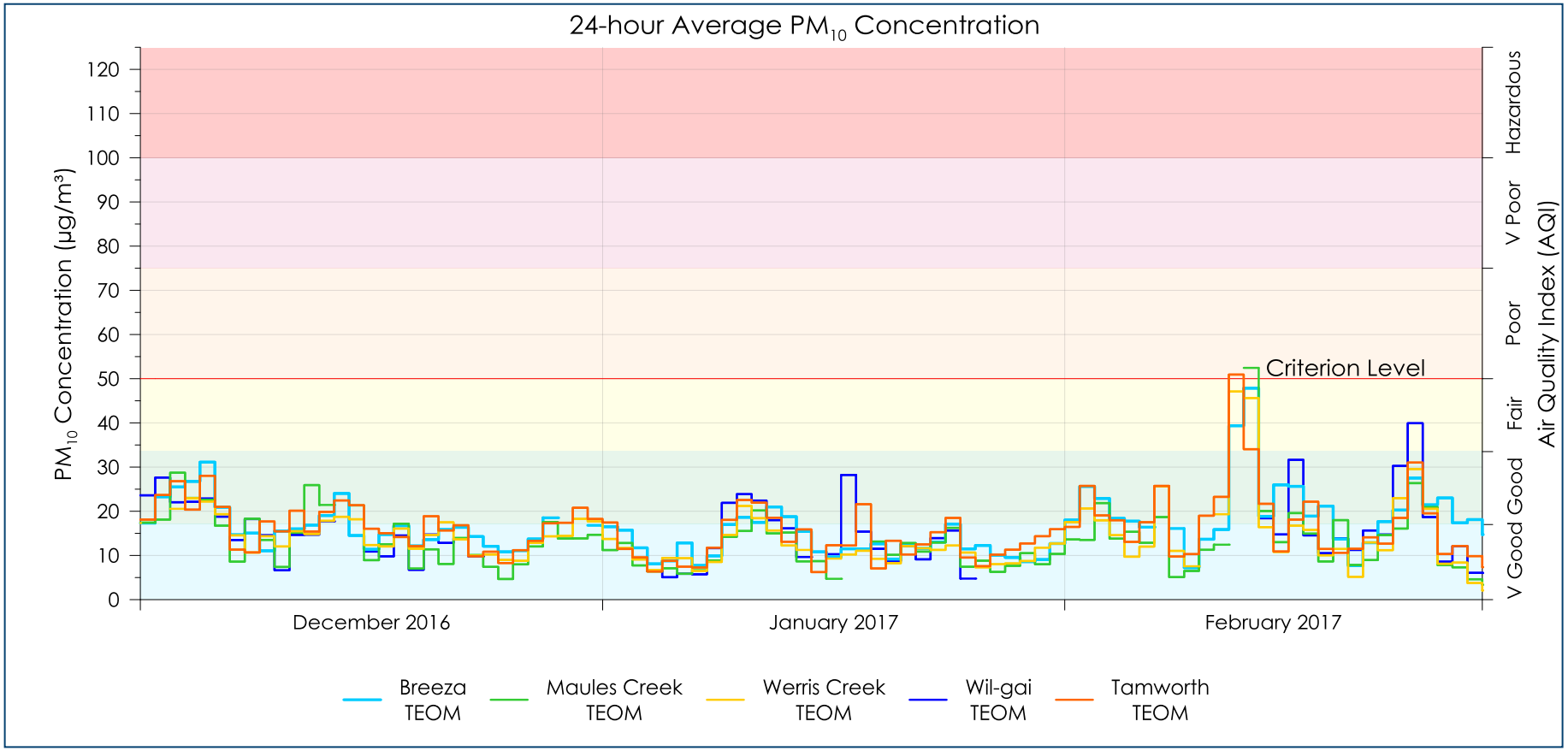


Figure 7-2: Namoi 24-hour average PM_{10} levels – Summer 2016/17

The recorded PM_{10} levels were generally very good or good during summer 2016/17. The Breeza and Werris Creek monitors recorded fair levels on two days, and the Wil-gai and Tamworth monitors recorded one day with fair levels. The Tamworth and Maules Creek monitors both recorded one day with poor PM_{10} levels above the 24-hour average criterion of 50µg/m^3 which were most likely caused by bushfire smoke. All other 24-hour average data were below the criterion in summer 2016/17.

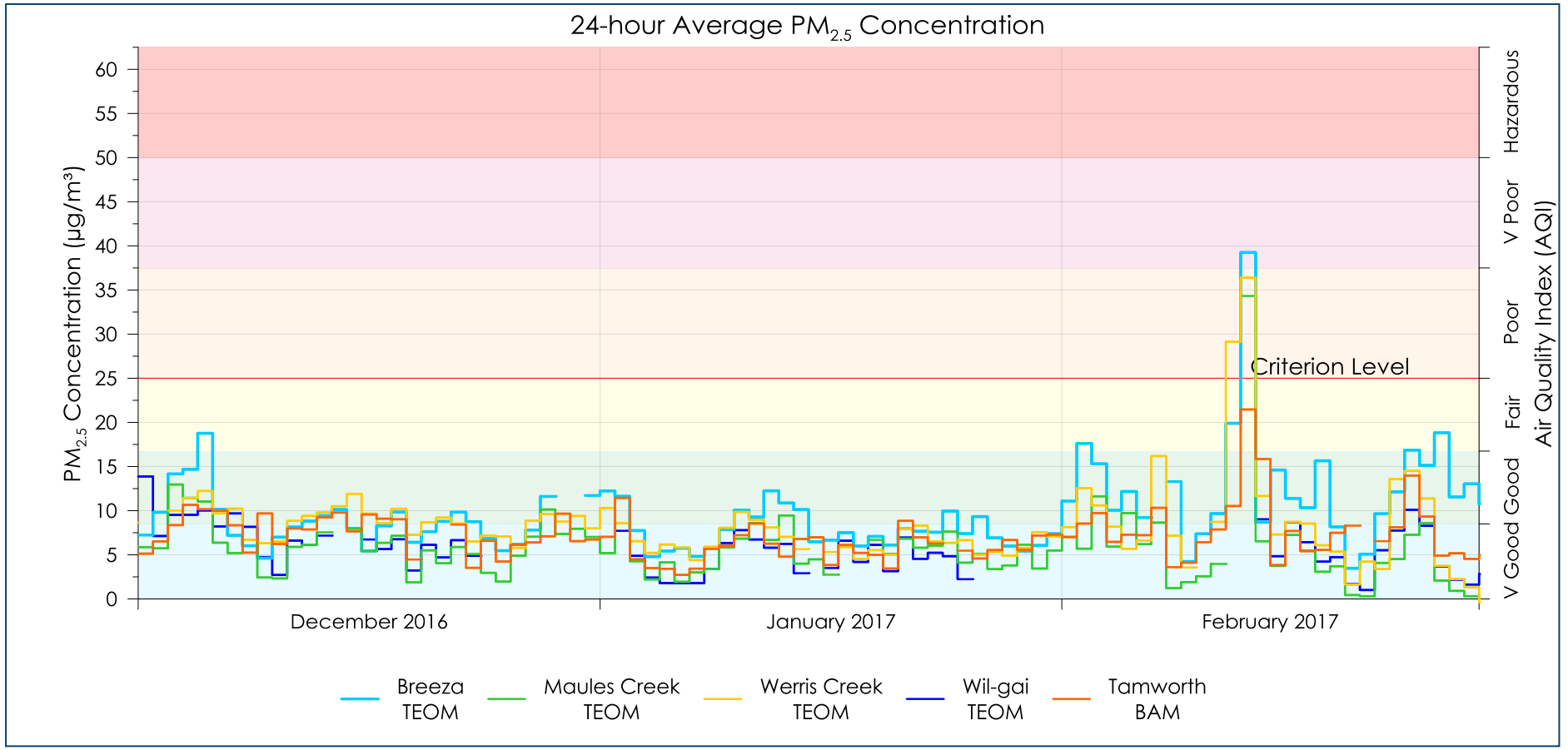


Figure 7-3: Namoi 24-hour average $PM_{2.5}$ levels – Summer 2016/17

The recorded $PM_{2.5}$ levels were generally very good to good during summer 2016/17. The Breeza and Tamworth monitors recorded five days and one day with fair levels respectively. The Werris Creek and Maules Creek monitors recorded poor levels over the criterion on two days and one day respectively, and the Breeza monitor recorded one day with very poor levels over the criterion, all of which were most likely caused by bushfire smoke. All other data recorded at the Namoi monitoring sites were below the criterion of 25µg/m^3.

8 ANALYSIS OF ELEVATED POLLUTANT LEVELS

There were six elevated levels above the applicable criteria in Summer 2016/17, these included:

- 24-hour average PM_{10} level of 50.9µg/m^3 recorded at Tamworth on 12 February 2017;
- 24-hour average $PM_{2.5}$ level of 29.1µg/m^3 recorded at Werris Creek on 12 February 2017;
- 24-hour average PM_{10} level of 52.5µg/m^3 recorded at Maules Creek on 13 February 2017;
- 24-hour average $PM_{2.5}$ level of 39.2µg/m^3 recorded at Breeza on 13 February 2017;
- 24-hour average $PM_{2.5}$ level of 34.3µg/m^3 recorded Maules Creek on 13 February 2017; and,
- 24-hour average $PM_{2.5}$ level of 36.4µg/m^3 recorded at Werris Creek on 13 February 2017.

8.1 Tamworth, Breeza, Werris Creek and Maules Creek Monitors – 12 and 13 February 2017

Figure 8-1 presents a plot of the 1-hour average PM_{10}, $PM_{2.5}$, wind speed and wind direction data recorded at Namoi monitoring sites on 12 and 13 February 2017. Data from the Wil-gai monitoring site were unavailable during this period.

The figure shows that all of the monitors recorded elevated levels to some extent, and that the elevated PM_{10} and $PM_{2.5}$ levels occurred under wind directions ranging from the southwest to southeast.

The Namoi region experienced hot and dry conditions in early February 2017 with daily maximum temperatures frequently exceeding 40°C.

On 12 February the Gunnedah and Narrabri weather stations recorded extremely hot and dry conditions with daily maximum temperatures of 46.5°C and 3pm relative humidity levels of 9%, resulting in catastrophic fire danger conditions (**RFS, 2017**).

Figure 8-2 presents satellite imagery of the Namoi region on 12 and 13 February 2017. The image shows that there were fires to the south of the monitors with significant smoke plumes. It is highly likely that the high levels of particulates experienced in the Namoi region were caused by bushfire smoke transported from these fires when the wind direction changed from a north-westerly to a southerly in the evening on 12 February 2017.

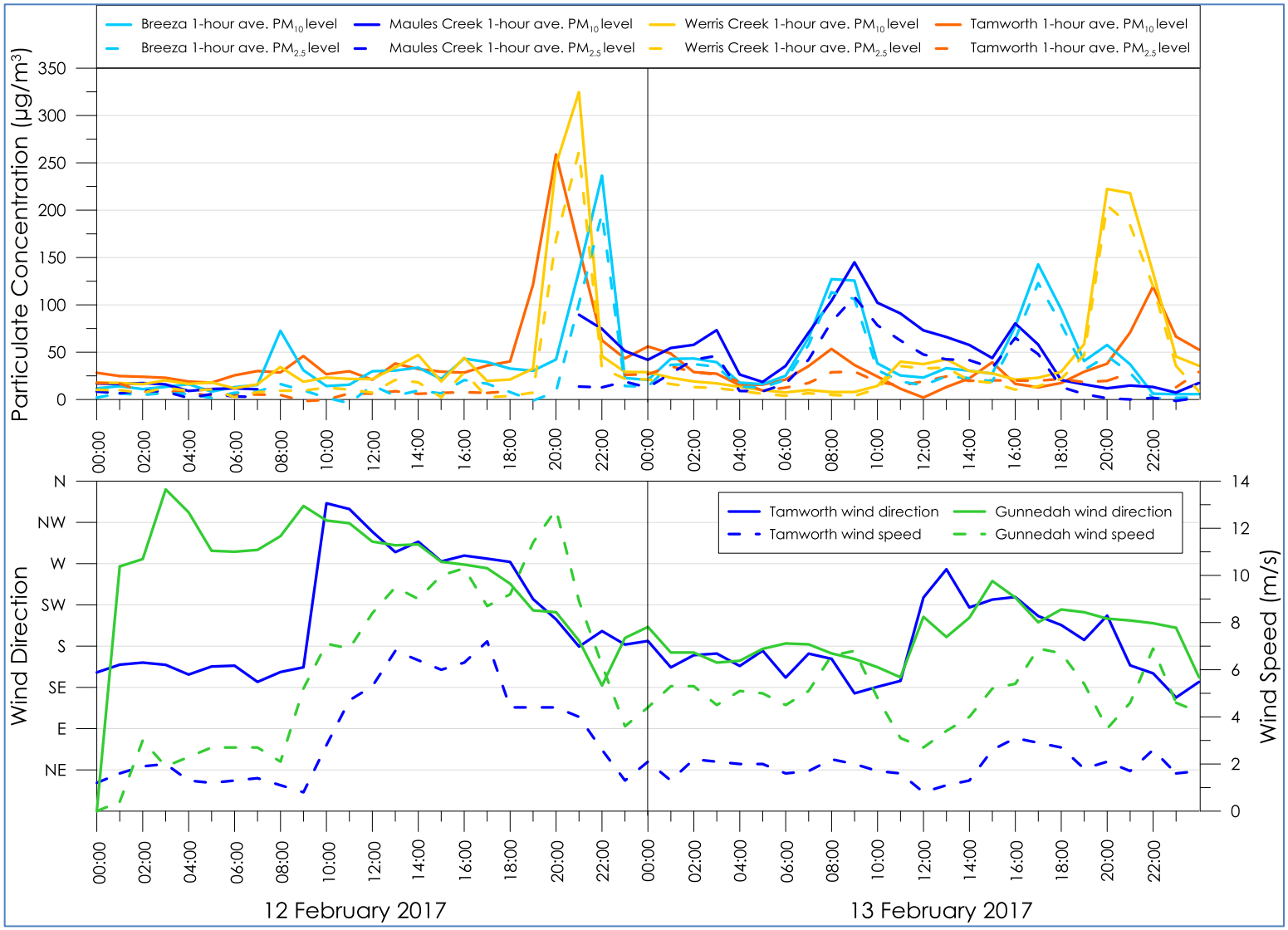


Figure 8-1: Analysis of elevated PM_{10} and $PM_{2.5}$ levels on 12 and 13 February 2017

The Namoi monitors recorded elevated PM_{10} and $PM_{2.5}$ levels during periods of southerly winds. The elevated levels were likely caused by bushfire smoke.

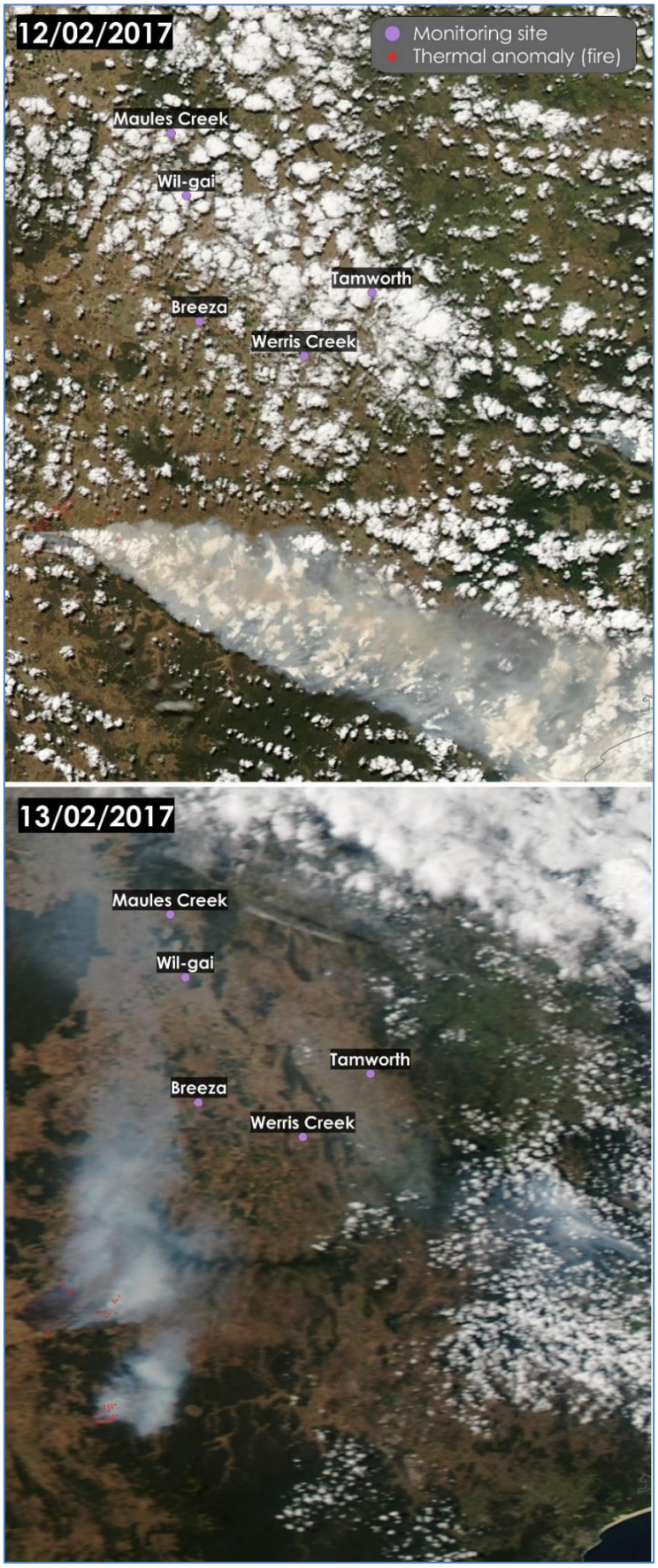


Figure 8-2: Satellite imagery of smoke from fire on the 12 and 13 Feburary 2017 (NASA, 2017)

9 CONCLUSIONS

The results indicate that the monitoring stations generally recorded good air quality in summer 2017.

The Tamworth and Maules Creek TEOM monitors recorded 24-hour average levels above the PM_{10} criterion of 50µg/m^3 on 12 February and 13 February 2017 respectively. These elevated levels were very likely caused by a fire event to the south of the monitors and the resulting smoke plume.

The Werris Creek monitor recorded 24-hour average $PM_{2.5}$ level above the criterion of 25µg/m^3 on the 12 and 13 February 2017. The Breeza and Maules Creek monitors also recorded levels above the $PM_{2.5}$ criterion on the 13 February 2017. These elevated $PM_{2.5}$ levels were also likely caused by smoke from the identified fire event.

Relative to the Air Quality Index:

- The measured PM_{10} levels were very good 56.7% to 75.6% of the time. Levels were very good or good 97.7% to 98.8% of the time. The Breeza and Werris Creek monitors recorded fair levels on two days (2.3%), and the Wil-gai and Tamworth monitors recorded one day (1.1%) with fair levels. The Tamworth and Maules Creek monitors both recorded one day (1.1%) with poor levels;
- The measured levels of $PM_{2.5}$ were very good 48.3% to 86.4% of the time. Levels were very good or good 93.1% to 100% of the time. The Breeza and Tamworth monitors recorded five days (5.7%) and one day (1.2%) with fair levels respectively. The Werris Creek and Maules Creek monitors recorded poor levels on two days (2.3%) and one day (1.2%) respectively, and the Breeza monitor recorded one day (1.1%) with very poor levels.

On this basis it can be concluded that the air quality in the Namoi region was generally good in summer 2016/17.

10 REFERENCES

NASA (2017)

NASA Worldview website. <https://worldview.earthdata.nasa.gov/>, accessed 23 June 2017.

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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NSW EPA (2017)

"Approved Methods for the Modelling and Assessment of Air Pollutants in NSW", State of NSW and Environment Protection Authority, January 2017.

RFS (2017)

"Dangerous fire conditions across NSW", NSW Rural Fire Service website, <http://www.rfs.nsw.gov.au/news-and-media/general-news/dangerous-fire-conditions-across-nsw>, accessed July 2017.

Appendix A

How to read a windrose

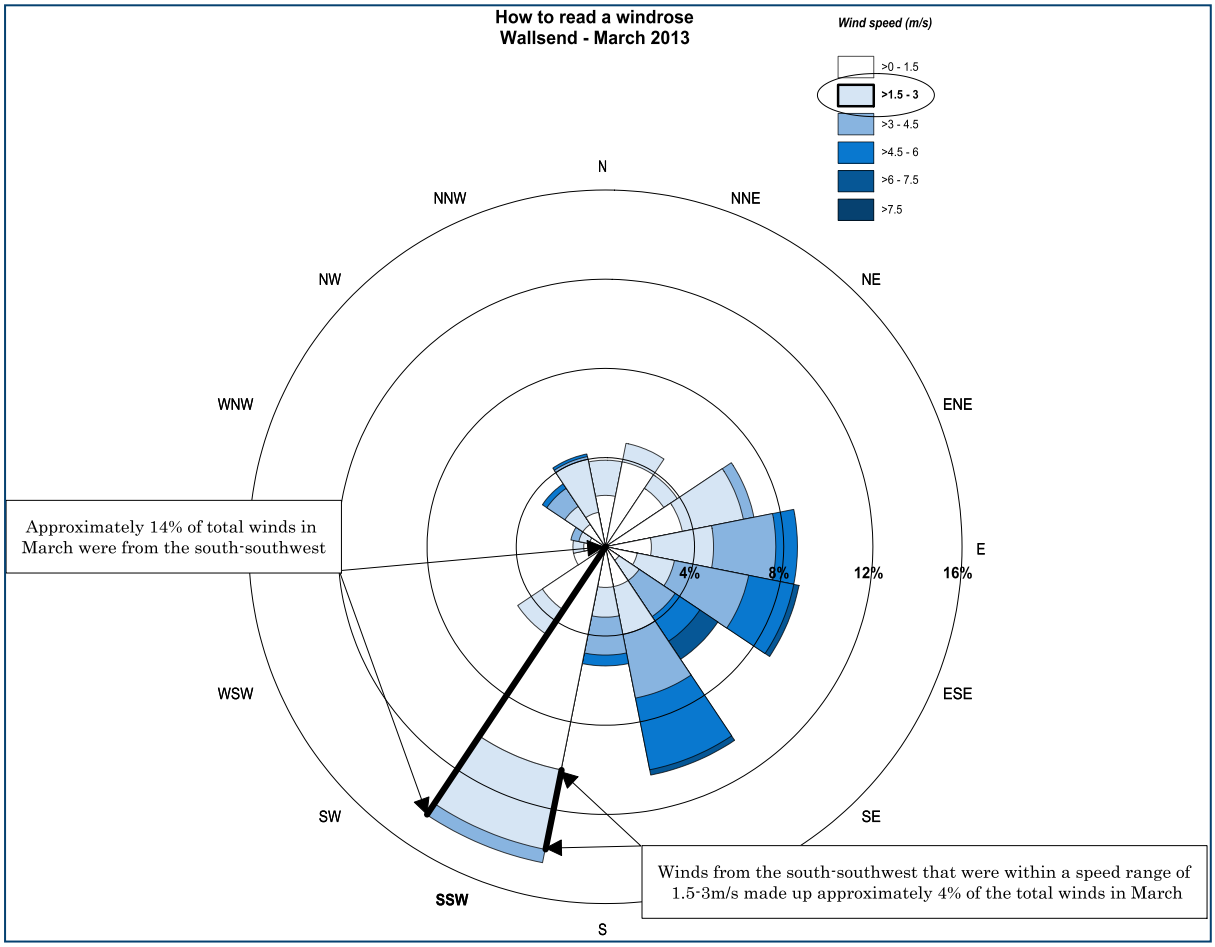

Figure A-1: How to read a windrose

Appendix B

Monitoring Data (Graphical)

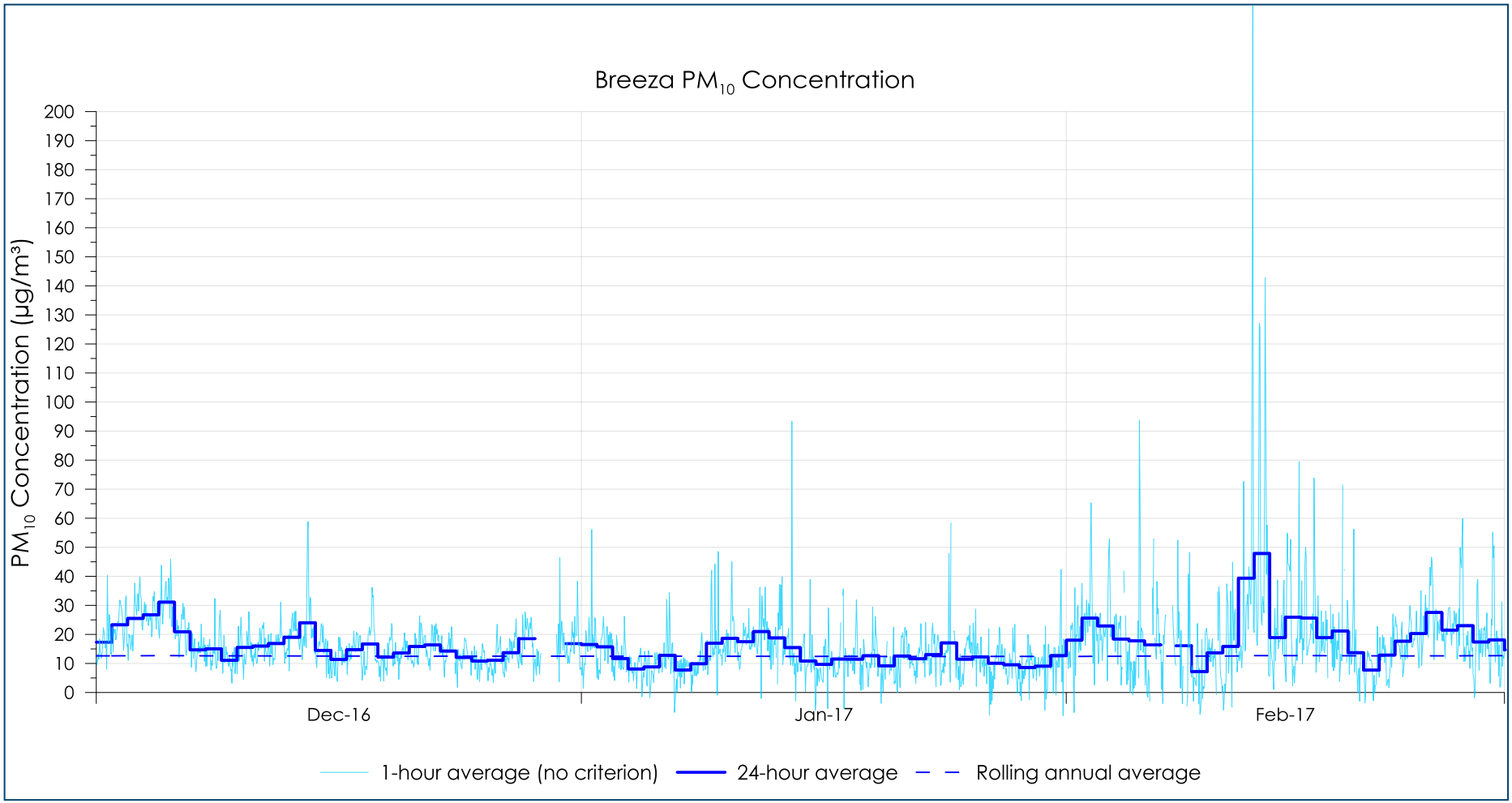

Figure B-1: Breeza PM_{10} (1-hour, 24-hour and rolling annual average) concentration – Summer 2016/17

Rolling annual average levels are based on the previous 12-month periods of data.

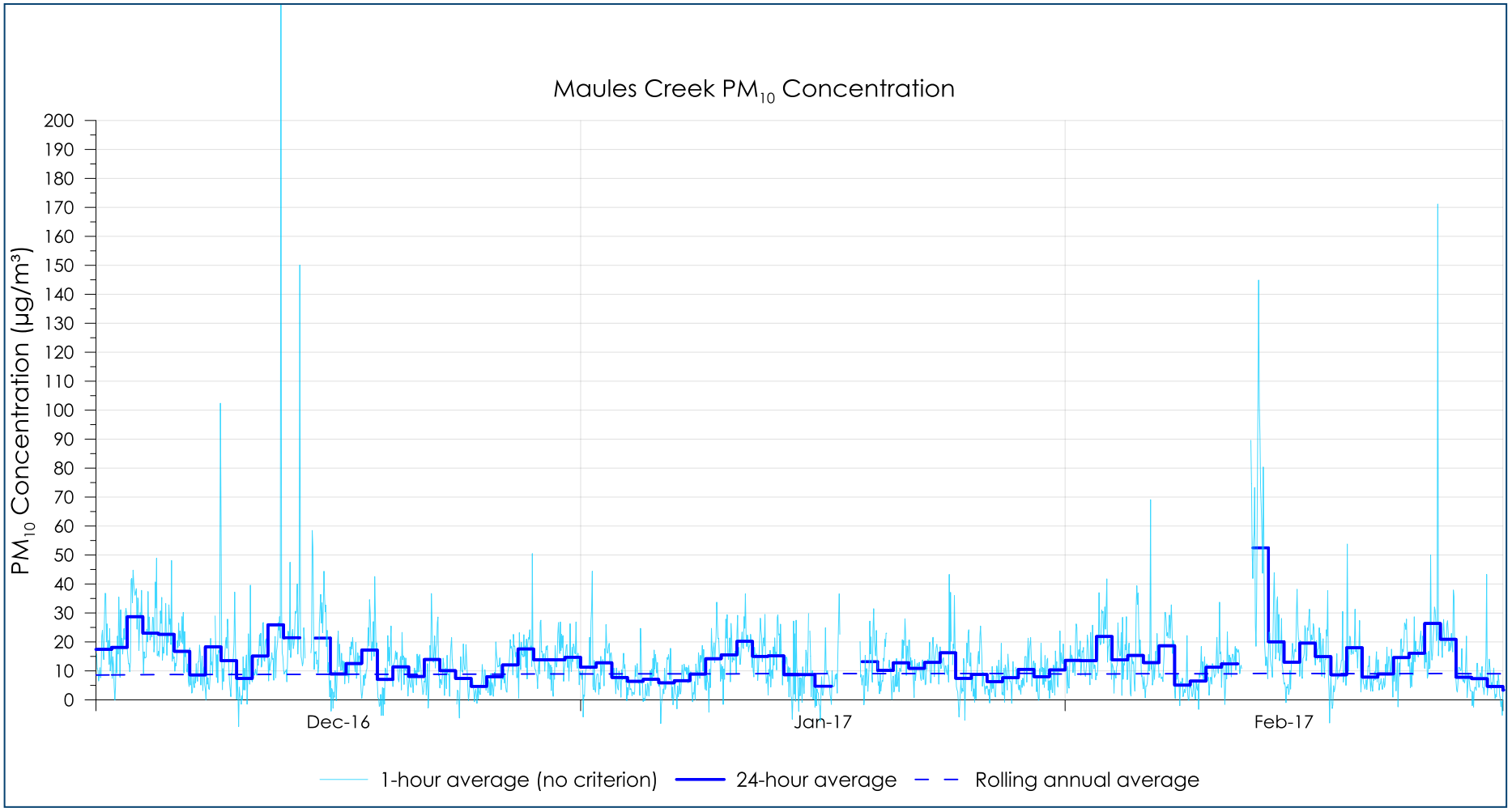

Figure B-2: Maules Creek PM_{10} (1-hour, 24-hour and rolling annual average) concentration – Summer 2016/17

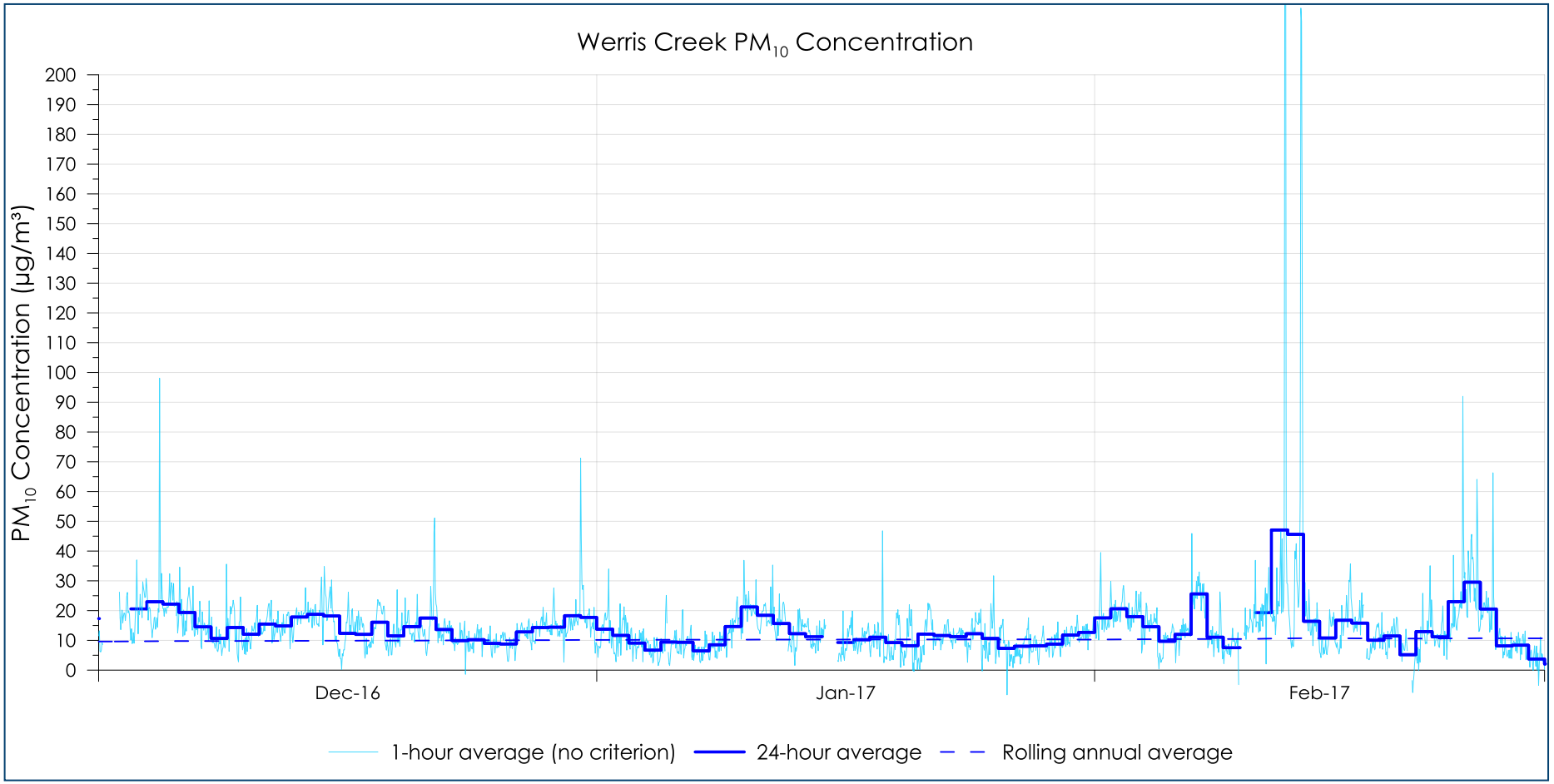

Figure B-3: Werris Creek PM_{10} (1-hour, 24-hour and rolling annual average) concentration – Summer 2016/17

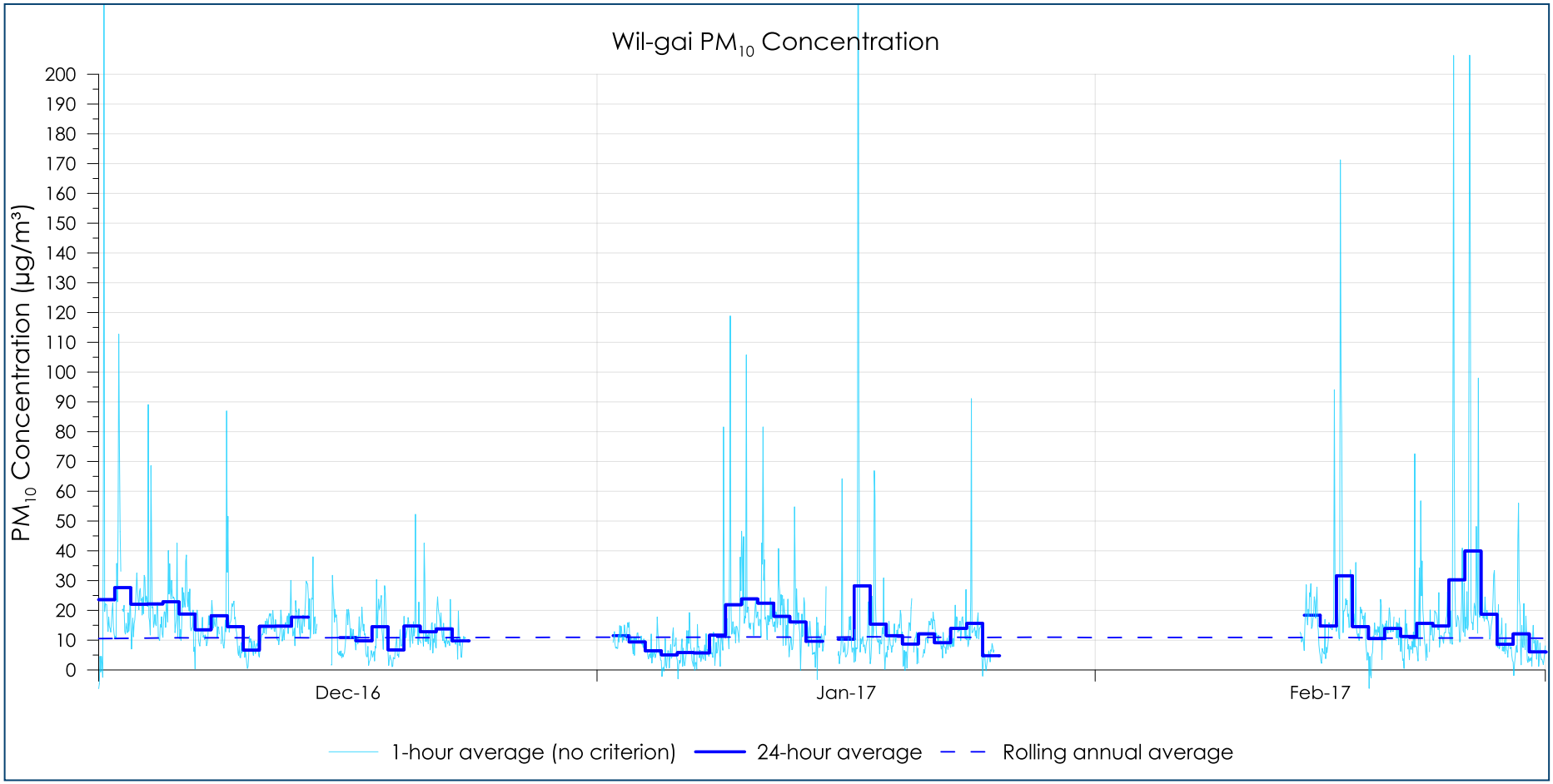

Figure B-4: Wil-gai PM_{10} (1-hour, 24-hour and rolling annual average) concentration – Summer 2016/17

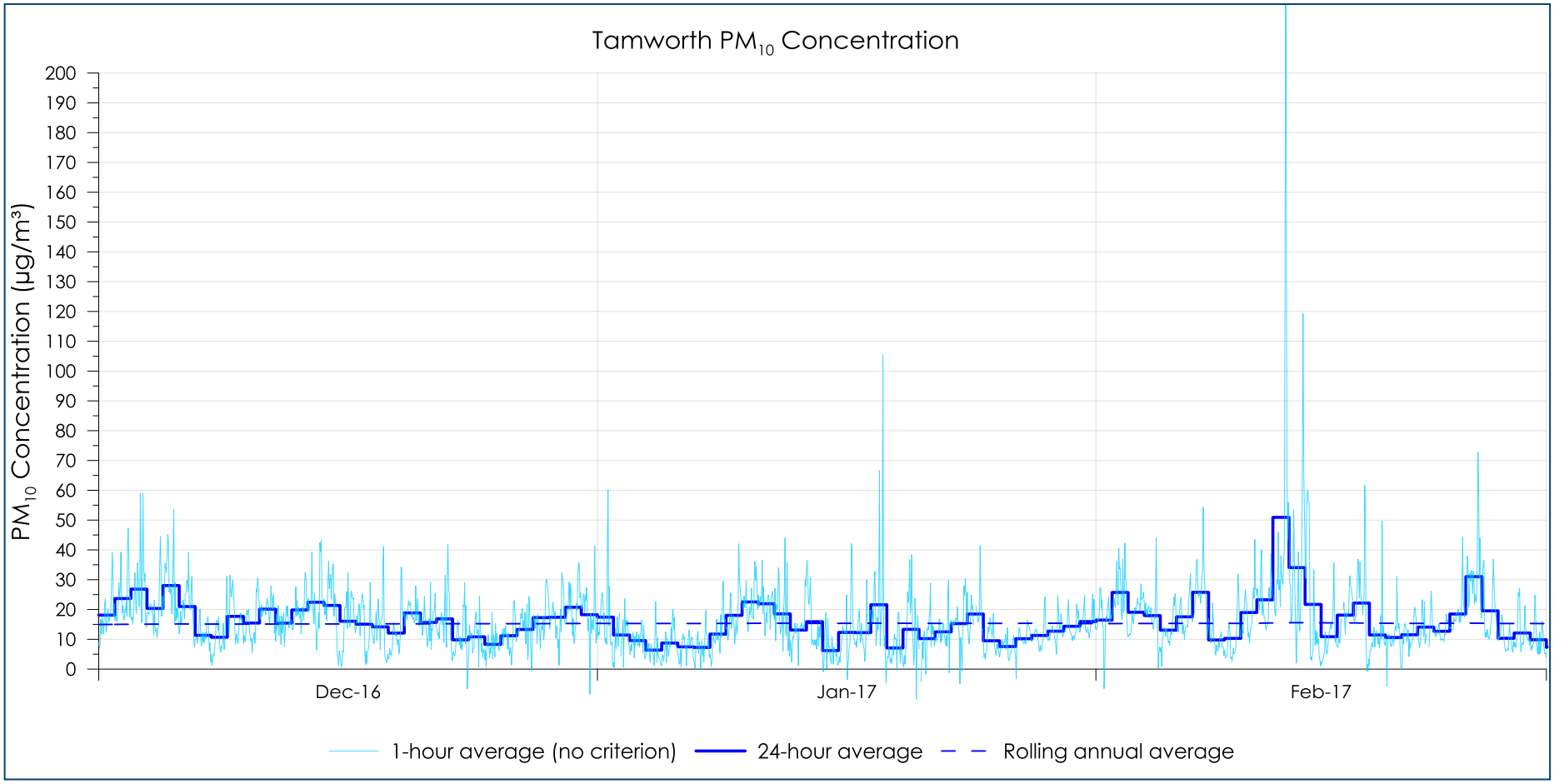

Figure B-5: Tamworth PM_{10} (1-hour, 24-hour and rolling annual average) concentration – Summer 2016/17

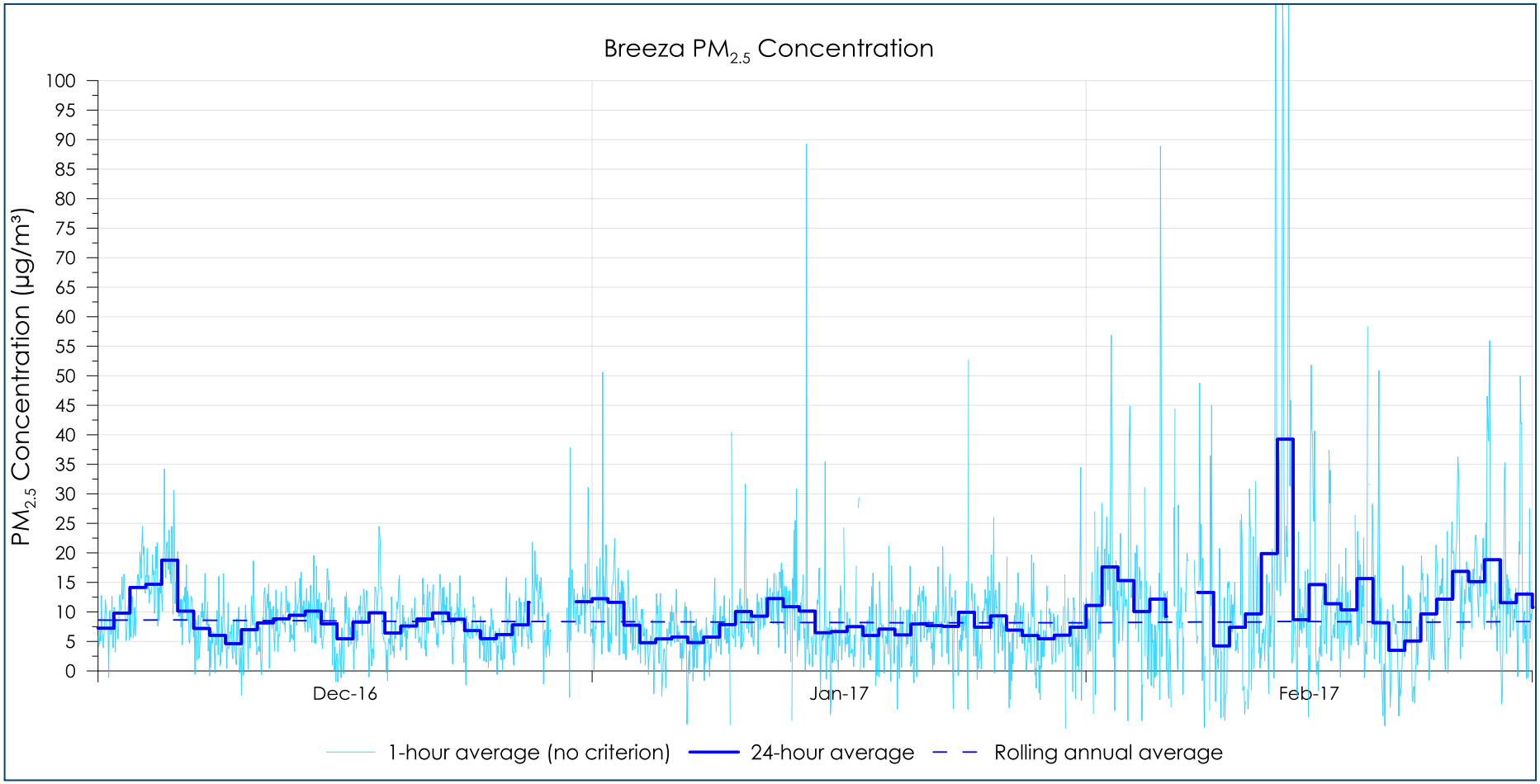

Figure B-6: Breeza $PM_{2.5}$ (1-hour, 24-hour and rolling annual average) concentration – Summer 2016/17

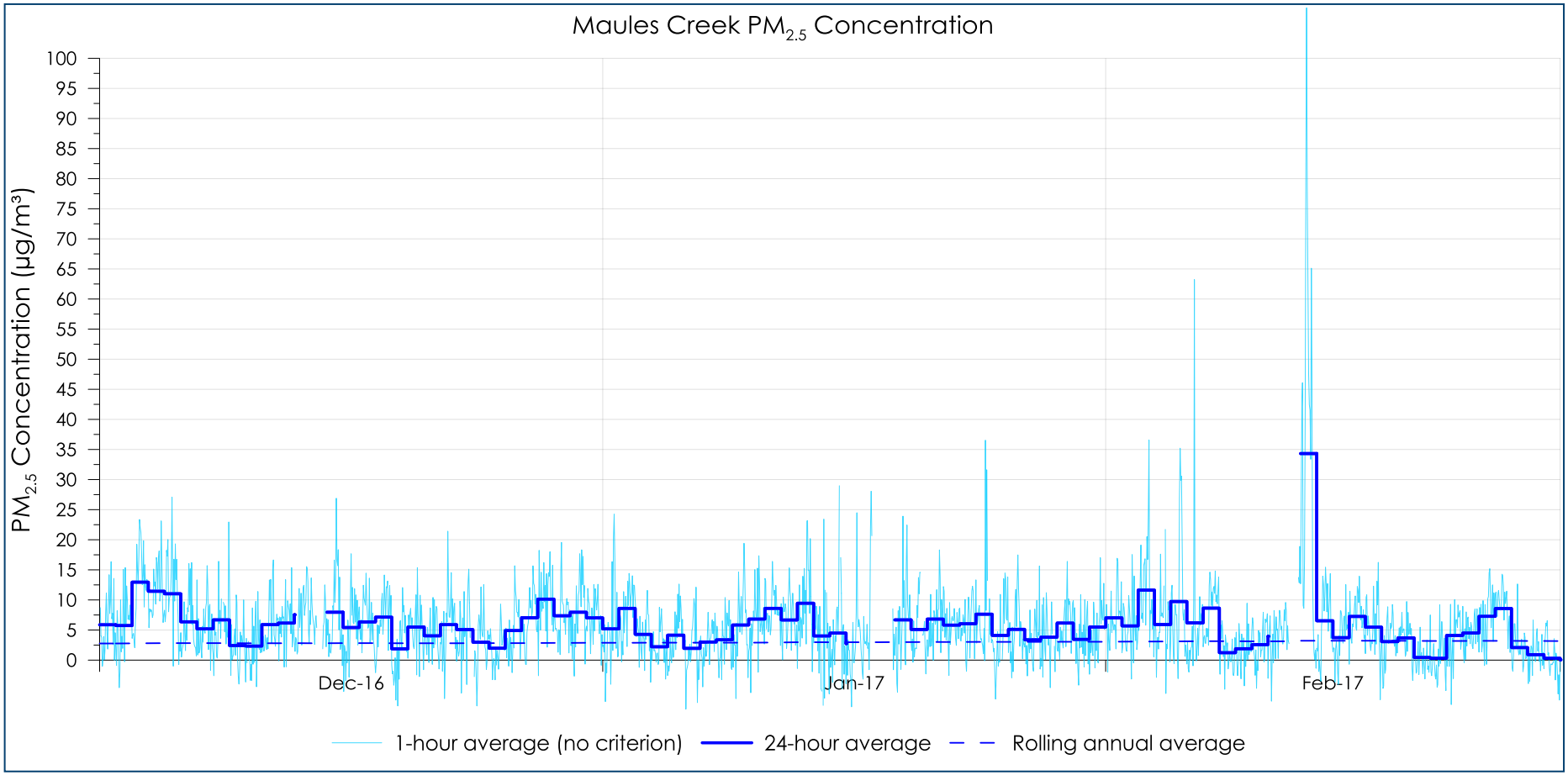

Figure B-7: Maules Creek $PM_{2.5}$ (1-hour, 24-hour and rolling annual average) concentration – Summer 2016/17

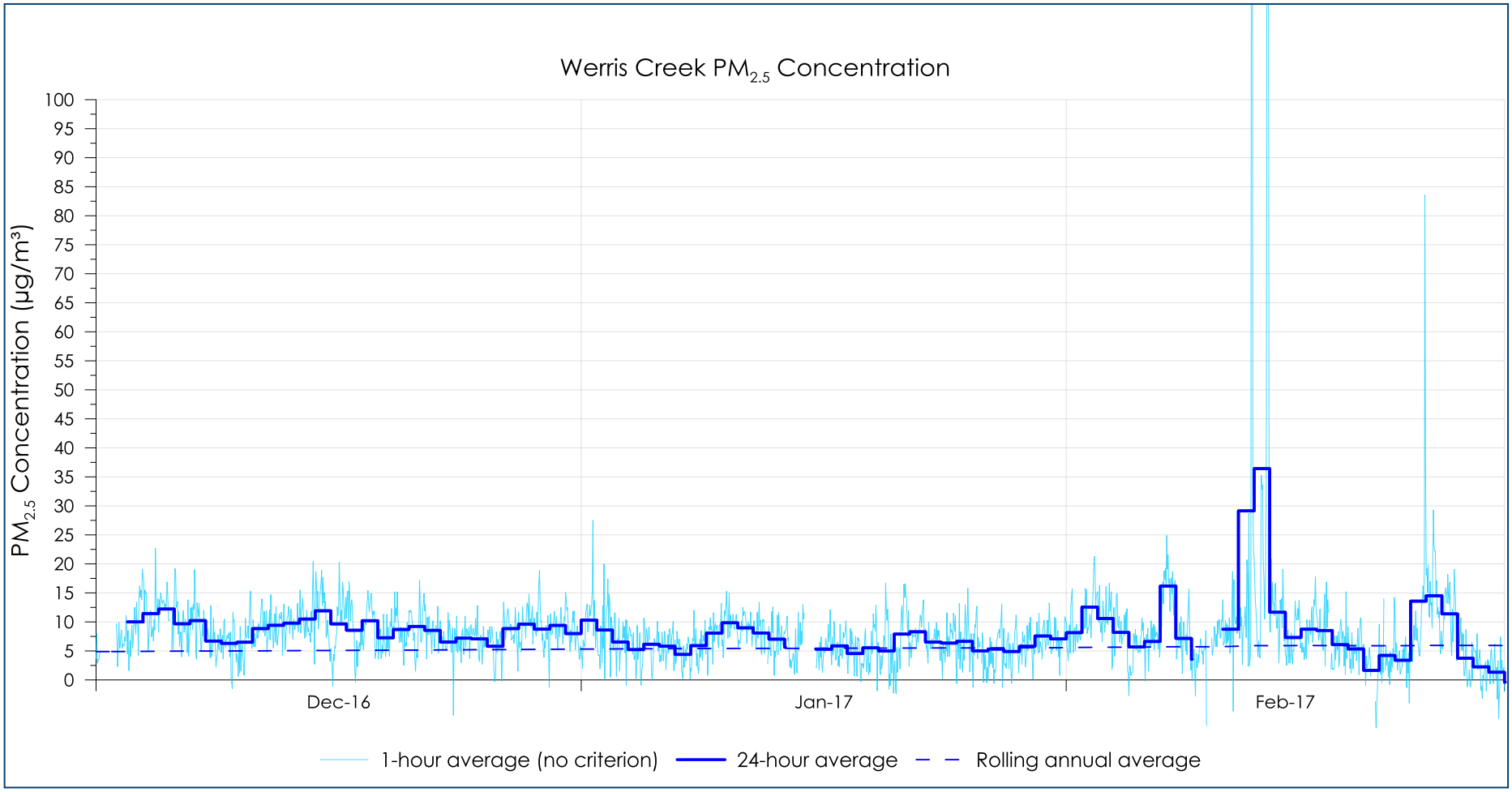

Figure B-8: Werris Creek $PM_{2.5}$ (1-hour, 24-hour and rolling annual average) concentration – Summer 2016/17

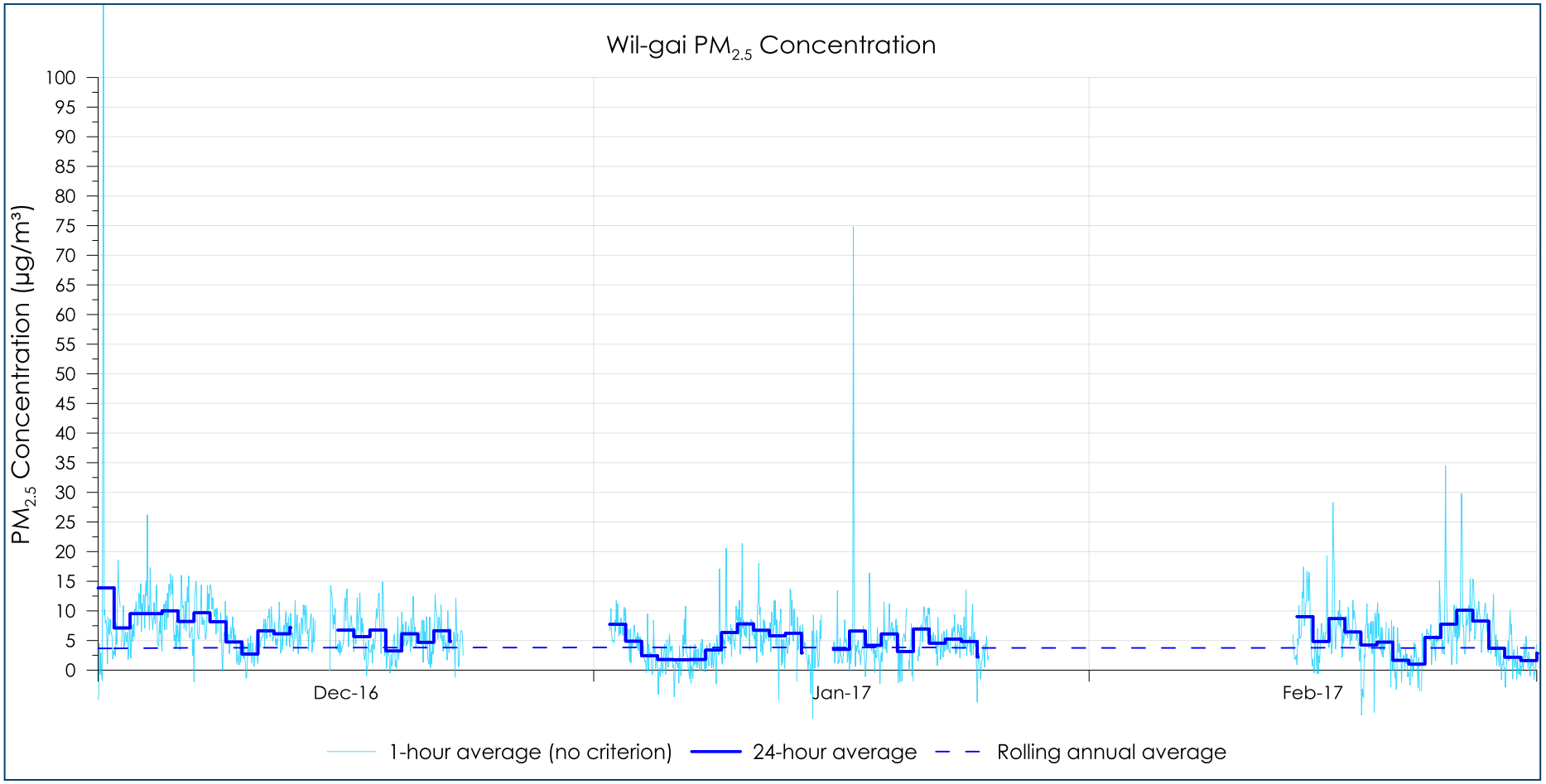

Figure B-9: Wil-gai $PM_{2.5}$ (1-hour, 24-hour and rolling annual average) concentration – Summer 2016/17

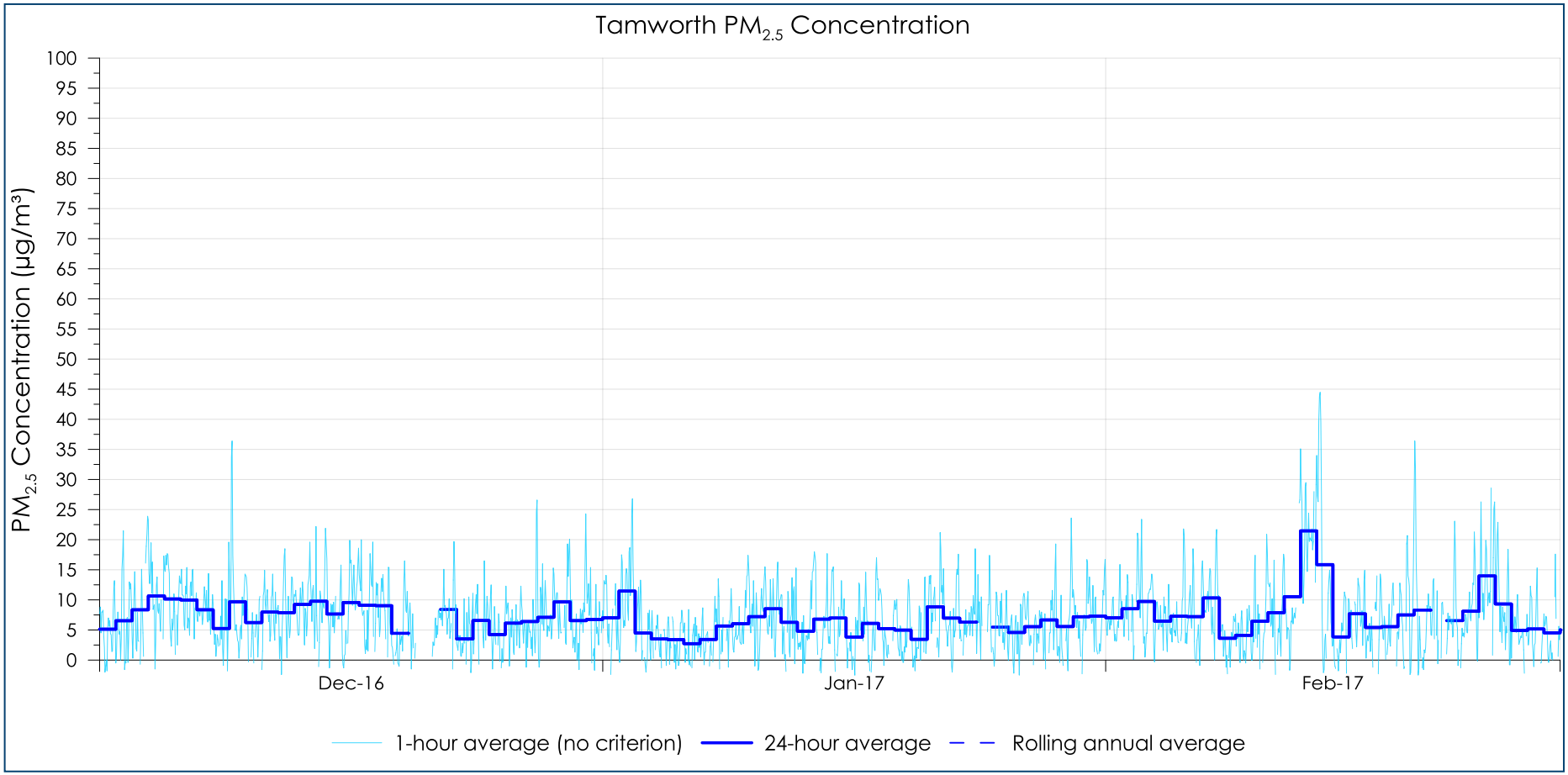

Figure B-10: Tamworth $PM_{2.5}$ (1-hour, 24-hour and rolling annual average) concentration – Summer 2016/17

Appendix C

Monitoring Data (Tabulated)

Table C-1: 24-hour average monitoring data

Date	PM_{10} (µg/m³)					$PM_{2.5}$ (µg/m³)				
	Breeza	Maules Creek	Werris Creek	Wil-gai	Tamworth	Breeza	Maules Creek	Werris Creek	Wil-gai	Tamworth
01/12/2016	17.3	17.4	-	23.6	18.1	7.2	5.9	-	13.9	5.1
02/12/2016	23.3	18.1	-	27.6	23.7	9.8	5.7	-	7.1	6.5
03/12/2016	25.5	28.7	20.6	22.0	26.8	14.2	13.0	10.0	9.5	8.4
04/12/2016	26.8	23.0	23.0	22.2	20.4	14.7	11.4	11.4	9.5	10.7
05/12/2016	31.1	22.6	22.2	22.9	28.0	18.8	11.0	12.2	10.0	10.2
06/12/2016	20.9	16.7	19.3	18.8	21.0	10.1	6.4	9.7	8.2	10.0
07/12/2016	14.7	8.6	14.5	13.5	11.3	7.2	5.2	10.2	9.7	8.3
08/12/2016	15.1	18.3	10.7	18.2	10.7	6.0	6.7	6.7	8.2	5.2
09/12/2016	11.1	13.5	14.3	14.6	17.7	4.6	2.4	6.3	4.7	9.7
10/12/2016	15.5	7.4	12.0	6.6	15.5	7.0	2.3	6.5	2.7	6.2
11/12/2016	16.0	15.1	15.5	14.7	20.1	8.1	5.9	8.8	6.6	8.0
12/12/2016	16.9	25.9	14.8	14.7	15.4	8.8	6.2	9.4	6.1	7.9
13/12/2016	19.0	21.4	17.8	17.7	19.9	9.4	7.5	9.8	7.2	9.2
14/12/2016	24.0	-	18.8	-	22.4	10.1	-	10.5	-	9.8
15/12/2016	14.5	21.3	18.2	-	21.4	8.0	8.0	11.9	-	7.7
16/12/2016	11.4	8.9	12.4	10.9	16.1	5.4	5.4	9.7	6.7	9.6
17/12/2016	14.8	12.5	12.0	9.8	15.0	8.3	6.4	8.6	5.6	9.1
18/12/2016	16.7	17.2	16.1	14.5	14.2	9.8	7.1	10.2	6.8	9.0
19/12/2016	12.1	7.0	11.5	6.7	12.1	6.4	1.9	7.3	3.2	4.5
20/12/2016	13.6	11.4	14.6	14.7	18.9	7.6	5.5	8.7	6.1	-
21/12/2016	15.9	8.1	17.5	12.8	15.7	8.8	4.0	9.2	4.7	-
22/12/2016	16.4	14.0	13.6	13.8	16.8	9.8	5.9	8.6	6.7	8.4
23/12/2016	14.3	10.1	9.9	9.8	9.8	8.8	5.1	6.5	4.9	3.5
24/12/2016	12.1	7.4	10.2	-	10.8	6.8	3.0	7.2	-	6.6
25/12/2016	10.8	4.7	9.0	-	8.3	5.5	2.0	7.1	-	4.2
26/12/2016	11.1	8.0	8.8	-	11.2	6.2	4.9	5.8	-	6.1
27/12/2016	13.7	12.0	12.8	-	13.3	7.8	7.0	8.9	-	6.4
28/12/2016	18.5	17.6	14.3	-	17.3	11.6	10.1	9.6	-	7.1
29/12/2016	-	13.8	14.4	-	17.4	-	7.4	8.7	-	9.7
30/12/2016	-	13.8	18.3	-	20.8	-	8.0	9.4	-	6.5
31/12/2016	16.8	14.7	17.7	-	18.3	11.7	7.0	8.0	-	6.7
01/01/2017	16.5	11.2	13.7	-	17.4	12.2	5.2	10.3	-	7.0
02/01/2017	15.7	12.8	11.7	11.5	11.5	11.6	8.6	8.6	7.7	11.5
03/01/2017	11.7	7.7	9.1	9.4	9.6	7.7	4.3	6.5	4.9	4.5
04/01/2017	8.1	6.4	6.7	6.5	6.4	4.8	2.2	5.2	2.4	3.5
05/01/2017	8.8	7.1	9.4	5.1	8.8	5.4	4.1	6.2	1.8	3.4
06/01/2017	12.8	5.9	9.4	5.8	7.5	5.7	1.9	5.8	1.8	2.7
07/01/2017	7.7	6.6	6.5	5.7	7.3	4.8	3.0	4.4	1.8	3.4
08/01/2017	9.9	8.9	8.5	11.7	11.8	5.7	3.4	5.9	3.4	5.7
09/01/2017	17.0	14.2	14.7	21.9	18.1	7.9	5.8	8.1	6.3	6.0
10/01/2017	18.6	15.5	21.2	23.9	22.5	10.1	6.8	9.9	7.8	7.2
11/01/2017	17.5	20.2	18.4	22.4	21.9	9.3	8.6	9.0	6.7	8.5
12/01/2017	21.0	15.0	15.6	18.0	18.5	12.3	6.7	8.1	5.8	6.3
13/01/2017	18.8	15.2	12.2	16.1	13.1	10.9	9.5	7.0	6.2	4.8
14/01/2017	15.4	8.7	11.2	9.6	15.9	10.1	4.0	5.7	2.9	6.8
15/01/2017	10.8	8.7	-	-	6.2	6.5	4.5	-	-	7.0
16/01/2017	9.7	4.7	9.3	10.3	12.3	6.7	2.7	5.3	3.5	3.8
17/01/2017	11.5	-	10.2	28.2	12.2	7.5	-	5.9	6.6	6.1
18/01/2017	11.5	-	11.1	15.4	21.6	6.0	-	4.5	4.2	5.2
19/01/2017	12.6	13.2	9.3	11.5	7.1	7.1	6.7	5.5	6.1	5.0
20/01/2017	9.2	10.1	8.2	8.7	13.3	6.1	5.1	5.0	3.2	3.5
21/01/2017	12.6	12.8	12.1	12.1	10.2	7.9	6.8	7.9	7.0	8.8
22/01/2017	11.6	10.9	11.6	9.1	12.5	7.7	5.8	8.3	4.6	7.0
23/01/2017	13.0	12.9	11.3	13.9	15.3	7.6	6.0	6.5	5.2	6.3
24/01/2017	17.1	16.3	12.2	15.7	18.5	10.0	7.6	6.4	4.8	-
25/01/2017	11.5	7.4	10.7	4.8	9.5	7.4	4.1	6.7	2.2	5.5
26/01/2017	12.3	8.8	7.3	-	7.6	9.3	5.1	5.0	-	4.6
27/01/2017	10.1	6.3	8.0	-	10.2	6.9	3.4	5.3	-	5.5
28/01/2017	9.5	7.7	8.2	-	11.3	6.0	3.8	4.9	-	6.7
29/01/2017	8.6	10.5	8.7	-	12.7	5.4	6.2	5.8	-	5.6
30/01/2017	9.1	8.0	11.8	-	14.4	6.1	3.4	7.6	-	7.2
31/01/2017	12.7	10.4	12.7	-	15.9	7.4	5.5	7.1	-	7.3
01/02/2017	18.0	13.6	17.5	-	16.5	11.1	7.0	8.2	-	7.0
02/02/2017	25.6	13.5	20.6	-	25.7	17.6	5.7	12.6	-	8.5

Date	PM_{10} (µg/m³)					$PM_{2.5}$ (µg/m³)				
	Breeza	Maules Creek	Werris Creek	Wil-gai	Tamworth	Breeza	Maules Creek	Werris Creek	Wil-gai	Tamworth
03/02/2017	22.9	21.9	18.0	-	19.1	15.3	11.6	10.6	-	9.7
04/02/2017	18.4	13.8	14.6	-	18.0	10.1	5.9	8.2	-	6.5
05/02/2017	17.8	15.4	9.7	-	13.1	12.2	9.7	5.7	-	7.3
06/02/2017	16.4	12.9	12.0	-	17.5	9.2	6.2	6.6	-	7.2
07/02/2017	-	18.7	25.6	-	25.7	-	8.6	16.2	-	10.3
08/02/2017	16.1	5.1	11.0	-	9.8	13.3	1.2	7.2	-	3.6
09/02/2017	7.2	6.5	7.5	-	10.3	4.2	1.9	3.6	-	4.1
10/02/2017	13.7	11.3	-	-	19.0	7.4	2.6	-	-	6.4
11/02/2017	15.9	12.4	19.3	-	23.3	9.7	4.0	8.7	-	7.9
12/02/2017	39.3	-	47.1	-	**50.9**	19.9	-	**29.1**	-	10.5
13/02/2017	47.9	**52.5**	45.6	-	34.1	**39.2**	**34.3**	**36.4**	-	21.5
14/02/2017	18.9	20.1	16.4	18.4	21.7	8.7	6.5	11.7	9.0	15.9
15/02/2017	26.0	13.0	10.8	14.7	10.9	14.6	3.7	7.3	4.8	3.8
16/02/2017	25.6	19.6	16.7	31.6	18.1	11.4	7.2	8.7	8.7	7.7
17/02/2017	18.9	14.9	15.8	14.6	22.2	10.3	5.5	8.5	6.4	5.4
18/02/2017	21.2	8.6	10.0	10.5	11.5	15.7	3.1	6.1	4.2	5.6
19/02/2017	13.7	18.0	11.5	13.9	10.6	8.2	3.7	5.3	4.7	7.5
20/02/2017	7.7	7.8	5.2	11.3	11.5	3.5	0.4	1.6	1.7	8.3
21/02/2017	12.9	8.9	12.9	15.6	14.1	5.1	0.3	4.2	1.0	-
22/02/2017	17.7	14.6	11.2	14.7	12.7	9.7	4.1	3.4	5.5	6.5
23/02/2017	20.3	16.1	23.0	30.3	18.5	12.1	4.5	13.6	7.8	8.1
24/02/2017	27.5	26.4	29.5	39.9	31.0	16.9	7.3	14.5	10.1	14.0
25/02/2017	21.5	20.9	20.6	18.7	19.5	15.1	8.6	11.4	8.3	9.3
26/02/2017	23.0	7.8	8.1	8.6	10.3	18.8	2.1	3.7	3.7	4.9
27/02/2017	17.4	7.3	8.4	12.1	12.1	11.6	0.9	2.3	2.2	5.2
28/02/2017	18.1	4.6	3.8	6.1	9.9	13.0	0.3	1.3	1.6	4.5

- Not applicable