

# Flinders Power

## Augusta Power Station Ambient Monitoring Network

### Ambient Air Quality Monitoring Validated Report

1<sup>st</sup> July 2019 – 31<sup>st</sup> July 2019

Report No.: DAT14792

Report issue date: 28<sup>th</sup> August 2019

Maintenance contract: MC2095

*ECOTECH PTY LTD. ABN: 32005752081*

*1492 Ferntree Gully Rd, Knoxfield VIC. 3180. AUSTRALIA*

*Tel No: 1300 364 946 Fax No: 1300 668 763*

*Email [ecotech@ecotech.com](mailto:ecotech@ecotech.com) WEB [www.ecotech.com](http://www.ecotech.com)*

Customer Details	
<b>Customer</b>	Flinders Power
<b>Contact name</b>	Brad Williams
<b>Address</b>	PO Box 15, Port Augusta, SA 5700 Australia
<b>Email</b>	brad.williams@flinderspower.com.au
<b>Phone</b>	0447 017 533

Revision History			
Revision	Report ID	Date	Analyst
0	DAT14792	28/08/2019	Diep LAM

**Report by:**

Diep Lam



**Approved Signatory:**

Jon Alexander



### Table of Contents

<b>Customer Details</b> .....	<b>2</b>
<b>Revision History</b> .....	<b>2</b>
<b>Table of Contents</b> .....	<b>3</b>
<b>List of Figures</b> .....	<b>4</b>
<b>List of Tables</b> .....	<b>4</b>
1.0 Introduction .....	6
2.0 Monitoring and Data Collection.....	6
<b>2.1. Siting Details</b> .....	<b>6</b>
<b>2.2. Monitored Parameters</b> .....	<b>8</b>
<b>2.3. Data Collection Methods</b> .....	<b>9</b>
2.3.1. NATA Endorsement and Comformity with Standards .....	10
2.3.2. Data Acquisition .....	11
<b>2.4. Data Validation and Reporting</b> .....	<b>11</b>
2.4.1. Validation .....	11
2.4.2. Validation Notes.....	11
2.4.3. Reporting.....	12
3.0 Calibrations and Maintenance .....	12
<b>3.1. Units and Uncertainties</b> .....	<b>12</b>
3.2. Maintenance .....	14
<b>3.2.1. Calibration &amp; Maintenance Summary Tables</b> .....	<b>14</b>
4.0 Results.....	15
<b>4.1. Data Capture</b> .....	<b>15</b>

4.2. Graphic Representations.....	17
5.0 Valid Data Exception Tables.....	28
6.0 Report Summary .....	30
Appendix 1 - Definitions & Abbreviations.....	31
Appendix 2 - Explanation of Exception Table .....	32

### List of Figures

Figure 1: Flinders Power – Augusta Power Station Monitoring Stations Locations .....	8
Figure 2: Met Station Wind Rose .....	17
Figure 3: Exactus BAM 1 (STN) PM <sub>10</sub> Scatter Plot 1 Hour Averages .....	18
Figure 4: Exactus BAM 2 (LMO) PM <sub>10</sub> Scatter Plot 1 Hour Averages.....	19
Figure 5: North E-Sampler PM <sub>10</sub> Scatter Plot 1 Hour Averages.....	20
Figure 6: East E-Sampler PM <sub>10</sub> Scatter Plot 1 Hour Averages .....	21
Figure 7: South E-Sampler PM <sub>10</sub> Scatter Plot 1 Hour Averages.....	22
Figure 8: Exactus BAM 1 (STN) and 2 (LMO) PM <sub>10</sub> 24 Hour Averages .....	23
Figure 9: North E-Sampler, East E-Sampler, and South E-Sampler PM <sub>10</sub> 24 Hour Averages .....	24
Figure 10: Met Station Ambient Temperature 5 Minute Averages .....	25
Figure 11: Met Station Relative Humidity 5 Minute Averages .....	26
Figure 12: Met Station Rainfall 24 Hour Data .....	27

### List of Tables

Table 1: Augusta Power Station monitoring site locations.....	6
Table 2: Monitoring station siting audit against Standards .....	7
Table 3: Parameters measured at the Augusta Power Station monitoring stations .....	8



Table 4: Methods .....	9
Table 5: Units and Uncertainties.....	13
Table 6: Augusta Power Station PM <sub>10</sub> Maintenance Table July 2019 .....	14
Table 7: Augusta Power Station Met Station Maintenance Table July 2019.....	14
Table 8: Monthly Data Capture for Augusta Power Station Monitoring Network for July 2019.....	16
Table 9: Exactus BAM 1 (STN) Valid Data Exception Table .....	28
Table 10: Exactus BAM 2 (LMO) Valid Data Exception Table.....	28
Table 11: North E-Sampler Valid Data Exception Table.....	28
Table 12: East E-Sampler Valid Data Exception Table.....	29
Table 13: South E-Sampler Valid Data Exception Table.....	29
Table 14: Met Station Valid Data Exception Table.....	29

## 1.0 Introduction

Ecotech Pty Ltd was commissioned by Flinders Power to provide monitoring and data reporting for the Augusta Power Station ambient air quality monitoring network, located as detailed in Table 1. Ecotech commenced data collection from the monitoring stations on 1/02/2017.

This report presents the data for July 2019.

The data presented in this report:

- Describes air quality measurements;
- Compares monitoring results;
- Has been quality assured;
- Comforms with NATA accreditation requirements, where applicable.

## 2.0 Monitoring and Data Collection

### 2.1. Siting Details

The Augusta Power Station air quality monitoring network consists of six ambient air quality monitoring stations. The station's location and siting details are described below.

**Table 1: Augusta Power Station monitoring site locations**

Stations	Geographical Coordinates	Height Above Sea Level (m)
Exactus BAM 1 (STN)	32°30'47.71"S, 137°50'11.90"E	34
Exactus BAM 2 (LMO)	32°30'36.04"S, 137°47'08.93"E	9
North E-Sampler	32°31'11.00"S, 137°47'33.00"E	9
East E-Sampler	32°31'29.00"S, 137°48'45.00"E	10
South E-Sampler	32°32'60.00"S, 137°48'15.00"E	10
Met Station	32°32'40.70"S, 137°47'41.10"E	18

Flinders Power stations are audited against the guidelines and mandatory requirements in the standards below, as relevant:

- AS/NZS 3580.1.1:2016 “Methods for sampling and analysis of ambient air – guide to siting air monitoring equipment”,
- AS/NZS 3580.14:2014 “Methods for sampling and analysis of ambient air – Meteorological monitoring for ambient air quality monitoring applications”.

Audit results are detailed in Table 2 below.

An audit against AS/NZS 3580.14:2014 was conducted at Flinders Met station on 18/12/18. Siting of this station fully conforms with the guidelines and mandatory requirements.

Any non-conformances with the mandatory requirements of the above standards are detailed in section 2.3.1.

**Table 2: Monitoring station siting audit against Standards**

Stations	Audit date	Site classification	All guidelines met?	Deviation from guidelines
Exactus BAM 1 (STN)	17/12/18	Neighbourhood	Partly	Nearby sheds
Exactus BAM 2 (LMO)	17/12/18	Neighbourhood	Partly	Nearby EPA shelter
North E-Sampler	20/06/19	Peak	Yes	N/A
East E-Sampler	25/02/19	Peak	Yes	N/A
South E-Sampler	25/02/19	Peak	Yes	N/A



**Figure 1: Flinders Power – Augusta Power Station Monitoring Stations Locations**

## 2.2. Monitored Parameters

Table 3 below details the parameters monitored and the instruments used at the Augusta Power Station monitoring stations. Appendix 1 defines any abbreviated parameter names used throughout the report.

Sampling of all parameters is continuous.

Elevations in the table below is the height above ground level at the monitoring station.

**Table 3: Parameters measured at the Augusta Power Station monitoring stations**

Stations	Parameter Measured	Instrument and Measurement Technique
Exactus BAM 1 (STN) Exactus BAM 2 (LMO)	PM <sub>10</sub> (elevation 2.3m)	Ecotech Exactus BAM - Beta ray attenuation



Stations	Parameter Measured	Instrument and Measurement Technique
North E-Sampler East E-Sampler South E-Sampler	PM <sub>10</sub> (elevation 2.5m)	Met One E-Sampler – light scatter aerosol monitor
Met Station	Wind Speed (horizontal, elevation 11.5m)	Gill Windsonic – ultrasonic
	Wind Direction (elevation 11.5m)	Gill Windsonic – ultrasonic
	Sigma	Calculation
	Ambient Temperature (elevation 10m)	Vaisala HMP155
	Relative Humidity (elevation 10m)	Vaisala HMP155
	Rain (elevation 6.4m)	Tipping Bucket

### 2.3. Data Collection Methods

Table 4 below shows the methods used for data collection. Any deviations from the stated methods are detailed in section 2.3.1.

**Table 4: Methods**

Parameter Measured	Data Collection Methods Used	Description of Method
PM <sub>10</sub> (Exactus BAM)	AS/NZS 3580.9.11-2016	Methods of sampling and analysis of ambient air. Method 9.11: Determination of suspended particulate matter – PM <sub>10</sub> beta attenuation monitors
	Ecotech Laboratory Manual	In-house method 7.5 – Measurement of PM <sub>10</sub> , PM <sub>2.5</sub> and TSP using Beta Attenuation Monitor.
PM <sub>10</sub> (Met One E-Sampler)	Manufacturer's Instructions	Met One E-Sampler Operation Manual

Parameter Measured	Data Collection Methods Used	Description of Method
Vector Wind Speed (Horizontal)	AS/NZS 3580.14 2014	Methods for sampling and analysis of ambient air. Method 14: Meteorological monitoring for ambient air quality monitoring applications
	Ecotech Laboratory Manual	In-house method 8.1 Wind speed (Horizontal) by anemometer
Vector Wind Direction	AS/NZS 3580.14 2014	Methods for sampling and analysis of ambient air. Method 14: Meteorological monitoring for ambient air quality monitoring applications
	Ecotech Laboratory Manual	In-house method 8.3 Wind direction by anemometer
Sigma	AS/NZS 3580.14 2014	Methods for sampling and analysis of ambient air. Method 14: Meteorological monitoring for ambient air quality monitoring applications
	Ecotech Laboratory Manual	In-house method 8.3 Wind direction by anemometer
Ambient Temperature	AS/NZS 3580.14 2014	Methods for sampling and analysis of ambient air. Method 14: Meteorological monitoring for ambient air quality monitoring applications
	Ecotech Laboratory Manual	In-house method 8.4 Temperature ambient by thermoelectric techniques
Relative Humidity	AS/NZS 3580.14 2014	Methods for sampling and analysis of ambient air. Method 14: Meteorological monitoring for ambient air quality monitoring applications
	Ecotech Laboratory Manual	In-house method 8.5 – Relative humidity by hygrometer
Rain	AS/NZS 3580.14 2014	Methods for sampling and analysis of ambient air. Method 14: Meteorological monitoring for ambient air quality monitoring applications
	Ecotech Laboratory Manual	In-house method 8.7 – Rainfall by tipping bucket rain gauge

### 2.3.1. NATA Endorsement and Conformity with Standards

Unless stated below, parameters are monitored at the Augusta Power Station monitoring stations according to the methods detailed in Table 4 above.

- Measurement of PM<sub>10</sub> via E-Sampler is not covered by Ecotech's NATA scope of accreditation.
- Measurement of PM<sub>10</sub> via Exactus BAM 1 (STN) and Exactus BAM 2 (LMO) does not fully meet the recommendations of standard AS/NZS 3580.1.1:2016 due to the stations being located in close proximity to a shed and roadway.

### 2.3.2. Data Acquisition

Data acquisition is performed using a DataTaker DT800 Series data logger situated at the Met station, and direct link with the Met One E-Sampler and Exactus BAM instruments. Each logger is equipped with a 3G modem for remote data collection. The recorded data is remotely collected from the loggers on a daily basis (using Airodis™ version 5.1) and stored at Ecotech's Environmental Reporting Services (ERS) department in Melbourne, Australia. Data samples are logged in five minute intervals for the Met station and E-Samplers, and 15 minute intervals for the Exactus Bam data.

## 2.4. Data Validation and Reporting

### 2.4.1. Validation

The Ecotech ERS department perform daily data checks to ensure maximum data capture rates are maintained. Any equipment failures are communicated to the responsible field engineers for urgent rectification. Ecotech ERS maintains two distinct databases containing non-validated and validated data respectively.

The validated database is created by duplicating the non-validated database and then flagging data affected by instrument faults, calibrations and other maintenance activities. The data validation software requires the analyst to supply a valid reason (e.g. backed by maintenance notes, calibration sheets etc) in the database for flagging any data as invalid.

Details of all invalid or missing data are recorded in the Valid Data Exception Tables.

Validation is performed by the analyst, and the validation is reviewed. Graphs and tables are generated based on the validated 5 minute and 15 minute data as applicable.

### 2.4.2. Validation Notes

Due to the age of the E-sampler instrument, sensitivity has been reduced while measuring very low dust levels at the South site - Measurements tend to read zero  $\mu\text{g}/\text{m}^3$  for long period intermittently. Data reported for reference purposes only between 05/05/2019 and 31/07/2019.

### 2.4.3. Reporting

The reported data are included in a Microsoft Excel format file named “Flinders Power Monthly Data Report July 2019.xlsx”

The Excel file consists of 6 Excel worksheets:

1. Cover
2. 5 Minute Data
3. PM<sub>10</sub>RT 15 Minute Data
4. 1 Hour Data
5. 24 Hour Data
6. VDET

The data contained in this report is based on Australian Eastern Standard Time.

All averages are calculated from the 5 minute or 15 minute data as appropriate. Averages are based on a minimum of 75% valid readings within the averaging period.

Averaging periods of eight hours or less are reported for the end of the period, i.e. the hourly average 02:00am is for the data collected from 1:00am to 2:00am. One hour averages are calculated based on a clock hour. One day and one year averages are calculated based on calendar days.

#### **Wind Data Reporting**

Wind speed and wind direction data associated with calm wind conditions are reported in accordance with the requirements of AS/NZS 3580.14-2014. Calm wind conditions are defined as wind speeds below the starting threshold of the wind speed / direction sensors. Sensor starting thresholds are given in Table 5 “Measurement Range”.

## 3.0 Calibrations and Maintenance

### 3.1. Units and Uncertainties

The uncertainties for each parameter have been determined by the manufacturer’s tolerance limits of the equipment’s parameters, and by the data collection standard method.

The reported uncertainties are expanded uncertainties, calculated using coverage factors which give a level of confidence of approximately 95%.

**Table 5: Units and Uncertainties**

Parameter	Units	Resolution	Uncertainty <sup>1</sup>	Measurement Range
PM <sub>10</sub> (Exactus BAM)	µg/m <sup>3</sup>	1 µg/m <sup>3</sup>	24Hr: ± (5.5 % of reading + 4.0 µg/m <sup>3</sup> ) (in range 0 - 100 µg/m <sup>3</sup> )  Hr: ± (8 % of reading + 11.0 µg/m <sup>3</sup> )  k factor of 2.0	0 to 10mg/m <sup>3</sup>  LDL <sub>24hr</sub> =2µg/m <sup>3</sup>  LDL <sub>hr</sub> =10µg/m <sup>3</sup>
PM <sub>10</sub> (E-Sampler)	µg/m <sup>3</sup>	1 µg/m <sup>3</sup>	± 10% to gravimetric method <sup>2</sup>	0 to 65 mg/m <sup>3</sup>
Vector Wind Speed	m/s	0.1 m/s	±0.4 m/s or 2.0% of reading, whichever is greater  K factor of 2.0	Starting threshold 0m/s to 15 m/s
Vector Wind Direction	Deg	1 deg	±4 deg K factor of 2.0	0 deg to 360 deg Starting threshold: 0 m/s
Rain	mm	0.2 mm	± (9% of reading + 0.2mm)  K factor of 2.0	Rainfall rates of 0 to 80 mm/hr
Ambient Temperature	°C	0.1°C	± 0.6°C K factor of 2.0	-10°C to 50°C
Relative Humidity	%	1%	± 6% K factor of 2.0	1-100%

<sup>1</sup> Uncertainties are calculated based on the full measurement range unless stated otherwise

<sup>2</sup> Manufacturer's stated accuracy for nephelometer when calibrated for local particulate type

## 3.2. Maintenance

### 3.2.1. Calibration & Maintenance Summary Tables

The last calibrations for the following parameters were performed on the indicated dates. Data supplied after this time is subject to further validation, to be performed at the next calibration cycle.

Note: Maintenance and calibration dates may differ, as calibrations may be less frequent than scheduled maintenance visits.

Tables 6 and 7 on the next page indicate when the particulate and meteorological equipment were last maintained / calibrated.

“Calibration cycle” refers to the frequency of calibrations and intermediate calibration checks. The most frequent check or calibration is listed here.

**Table 6: Augusta Power Station PM<sub>10</sub> Maintenance Table July 2019**

Station	Parameter	Date of Last Maintenance	Maintenance Type	Date of Last Calibration	Calibration Cycle
Exactus BAM 1 (STN)	PM <sub>10</sub>	23/07/19	Monthly	20/06/19	3 Monthly
Exactus BAM 2 (LMO)	PM <sub>10</sub>	23/07/19	Monthly	21/06/19	3 Monthly
North E-Sampler	PM <sub>10</sub>	23/07/19	Monthly	23/05/19	3 Monthly
East E-Sampler	PM <sub>10</sub>	23/07/19	Monthly	23/05/19	3 Monthly
South E-Sampler	PM <sub>10</sub>	23/07/19	Monthly	23/05/19	3 Monthly

**Table 7: Augusta Power Station Met Station Maintenance Table July 2019**

Parameter	Date of Last Maintenance	Maintenance Type	Date of Last Calibration	Calibration Cycle
Wind Speed	23/07/19	Monthly	28/02/19 <sup>3</sup>	2 Yearly
Wind Direction	23/07/19	Monthly	28/02/19 <sup>4</sup>	2 Yearly
AT	20/06/19	6 Monthly	20/06/19	6 Monthly
RH	20/06/19	6 Monthly	20/06/19	6 Monthly
Rain	23/07/19	Monthly	18/12/18	Yearly

## 4.0 Results

### 4.1. Data Capture

Valid data capture refers to the amount of valid data collected during the report period. It is based on 5 and 15 minute data, for all continuously monitored parameters.

The percentage of valid data captured is calculated using the following equation:

$$\text{Valid Data capture} = (\text{Reported air quality data} / \text{Total data}) \times 100\%$$

Where:

- Reported air quality data = Number of samples (instrument readings) which have been validated through a quality assured process and excludes all data errors, zero data collection due to calibration, equipment failures, planned and unplanned maintenance.
- Total data = Total number of samples (instrument readings) expected for the sampling period. Total data is calculated based on the same averaging period as “reported air quality data” and the duration of the corresponding report period. e.g. for 5 minute data collected over a month of 31 days, the total data would be equal to 12 (5 minute samples in an hour) x 24 (hours in a day) x 31 (days in a month) = 8928 samples.

<sup>3</sup> Wind tunnel calibration was completed on 28/02/19 and installed at Met station on 25/03/19.

Table 8 on the next page displays data capture statistics for July 2019. **Bold** values in the table indicate data capture below 95%.

Details of all invalid or missing data affecting data affecting data capture are included in the Valid Data Exception Tables for each station, under the tab “VDET” in the Excel Files accompanying this report for each station and in section 5 of this report.

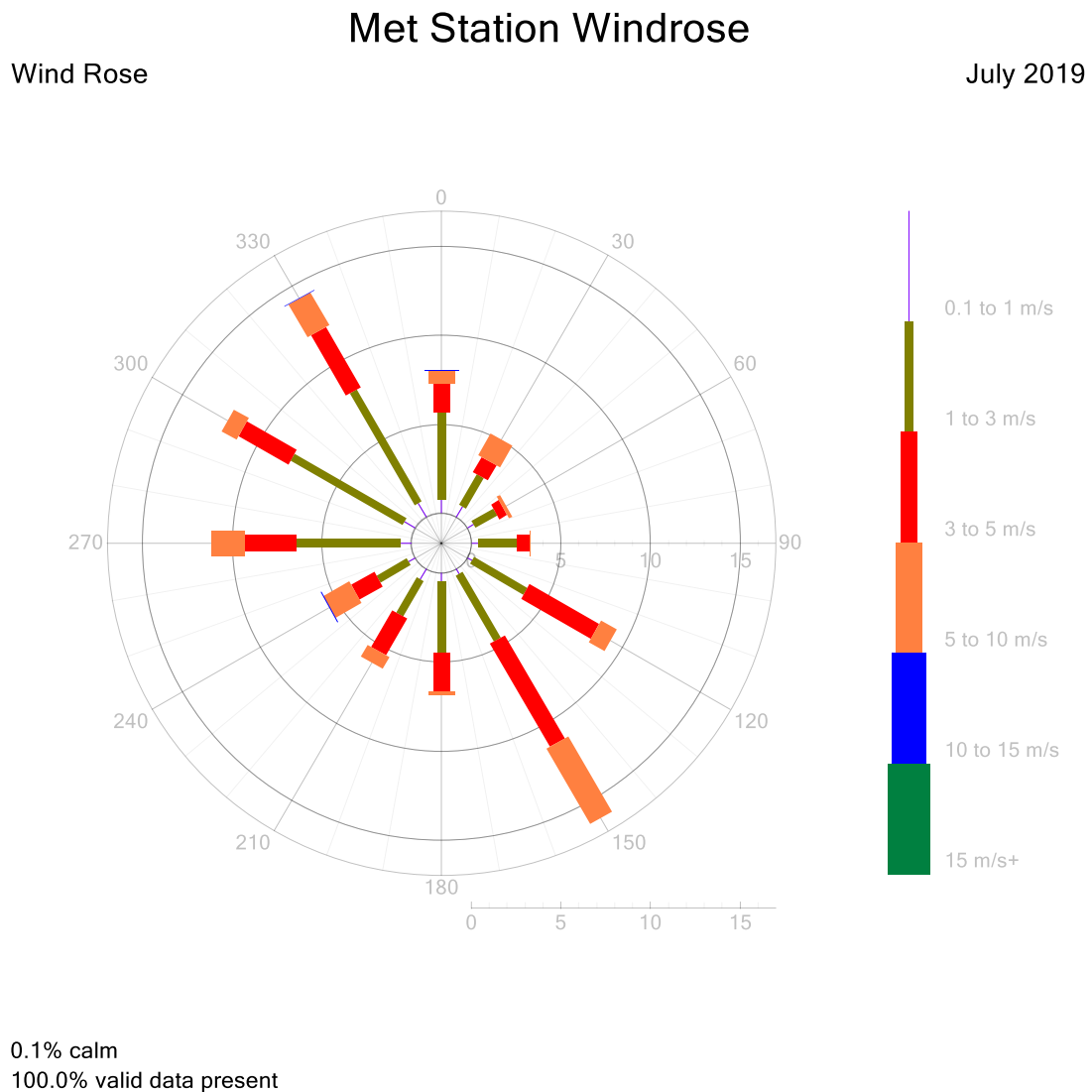
**Table 8: Monthly Data Capture for Augusta Power Station Monitoring Network for July 2019**

Station	Parameter	Data Capture (%)
Exactus BAM 1 (STN)	PM <sub>10</sub>	99.7
Exactus BAM 2 (LMO)	PM <sub>10</sub>	99.8
North E-Sampler	PM <sub>10</sub>	100.0
East E-Sampler	PM <sub>10</sub>	<b>81.8</b>
South E-Sampler	PM <sub>10</sub>	99.9
Met	WS, WD, Sigma	100.0
Met	AT	100.0
Met	RH	<b>87.7</b>
Met	Rain	100.0



### 4.2. Graphic Representations

Validated 5 minute data for WS, WD, Sigma, AT, RH, Rain, PM<sub>10</sub> (E-sampler) and 1 hour data for PM<sub>10</sub> (Exactus BAMs) were used to construct the following monthly graphic representations.



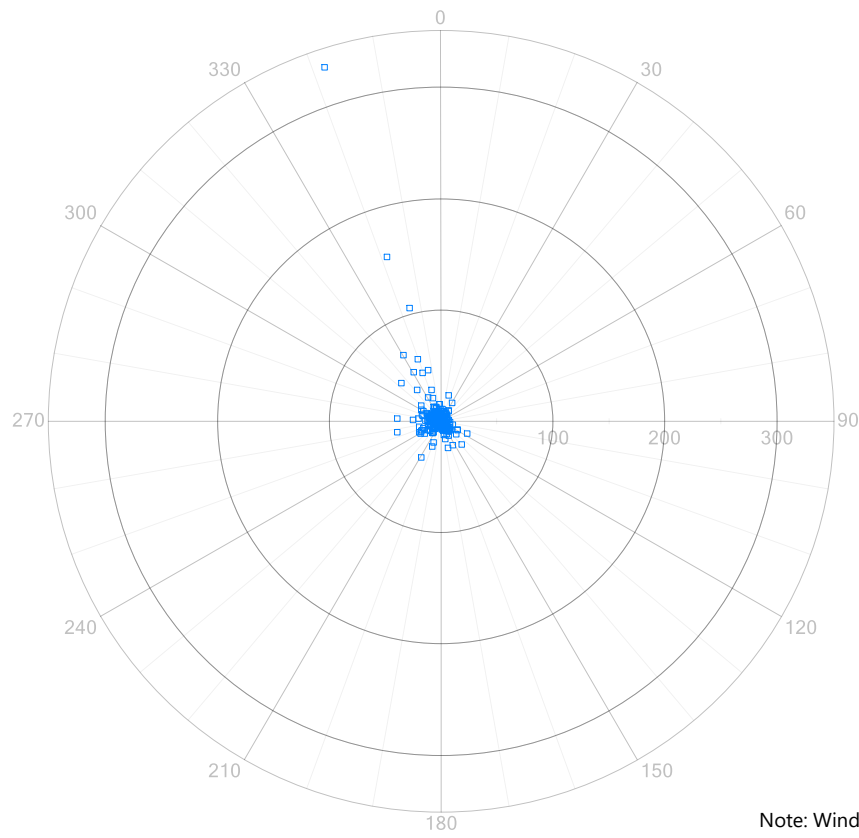
**Figure 2: Met Station Wind Rose**

Exactus BAM 1 (STN) PM<sub>10</sub> Scatter Plot

Polar Scatter

□ PM<sub>10</sub> 1hr Avg (µg/m<sup>3</sup>)

July 2019



99.7% valid data present

Note: Wind Data supplied from the Met Station

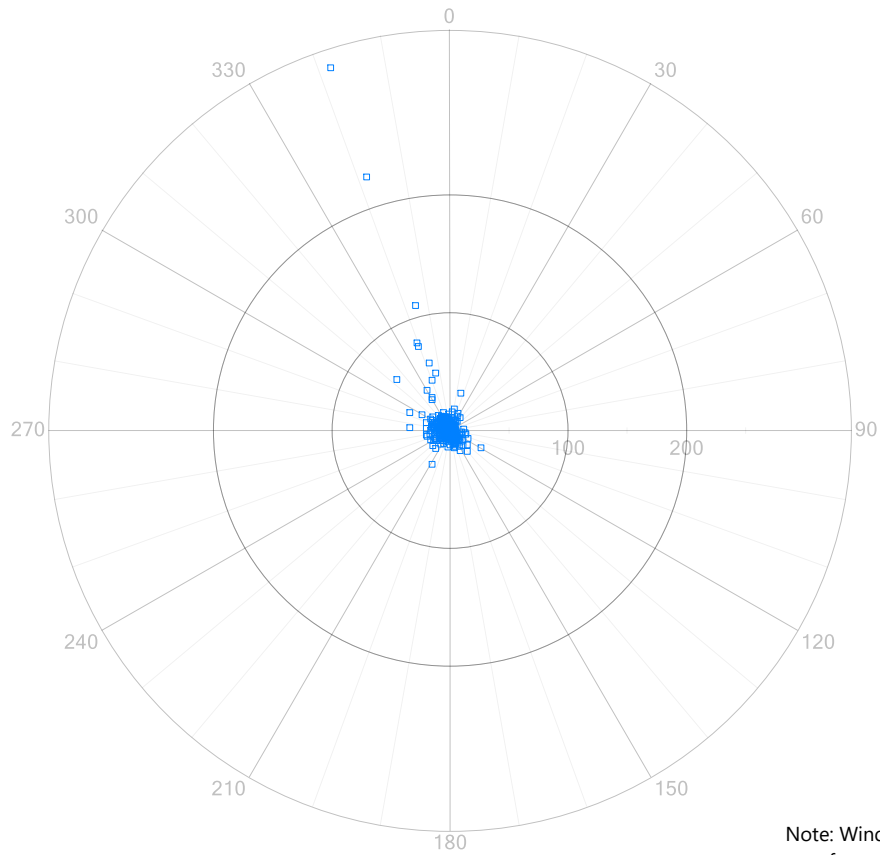
Figure 3: Exactus BAM 1 (STN) PM<sub>10</sub> Scatter Plot 1 Hour Averages

### Exactus BAM 2 (LMO) PM<sub>10</sub> Scatter Plot

July 2019

Polar Scatter

□ PM<sub>10</sub> 1hr Avg (µg/m<sup>3</sup>)



99.7% valid data present

Note: Wind Data supplied from the Met Station

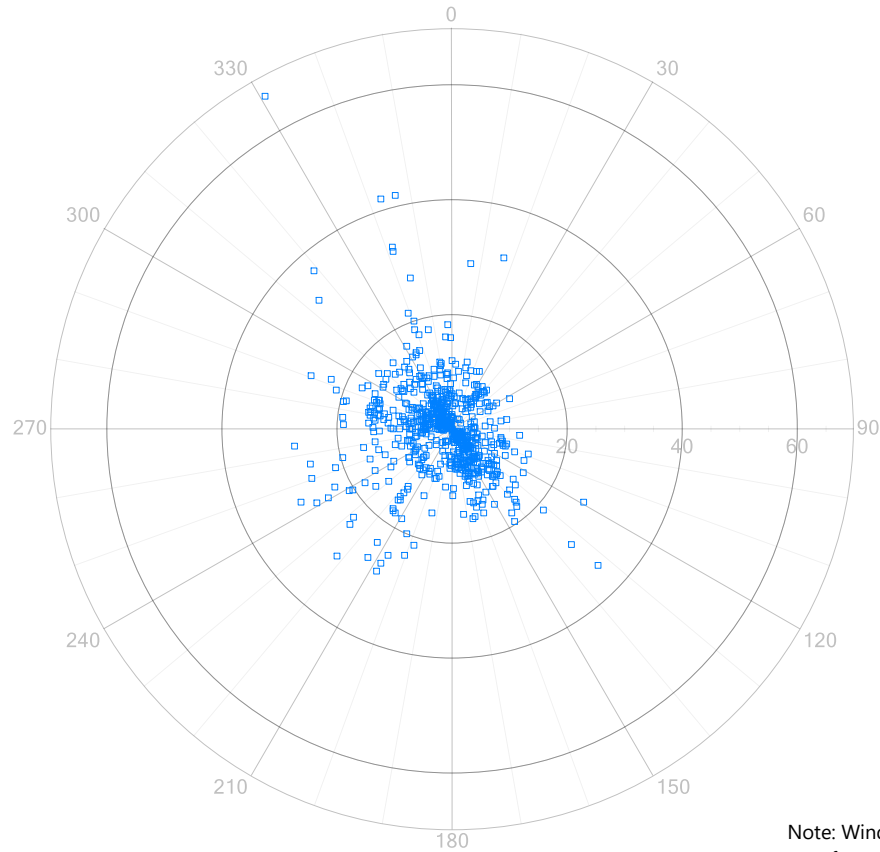
Figure 4: Exactus BAM 2 (LMO) PM<sub>10</sub> Scatter Plot 1 Hour Averages

### North E-Sampler PM<sub>10</sub> Scatter Plot

July 2019

Polar Scatter

□ PM<sub>10</sub> 1hr Avg (µg/m<sup>3</sup>)



100.0% valid data present

Note: Wind Data supplied from the Met Station

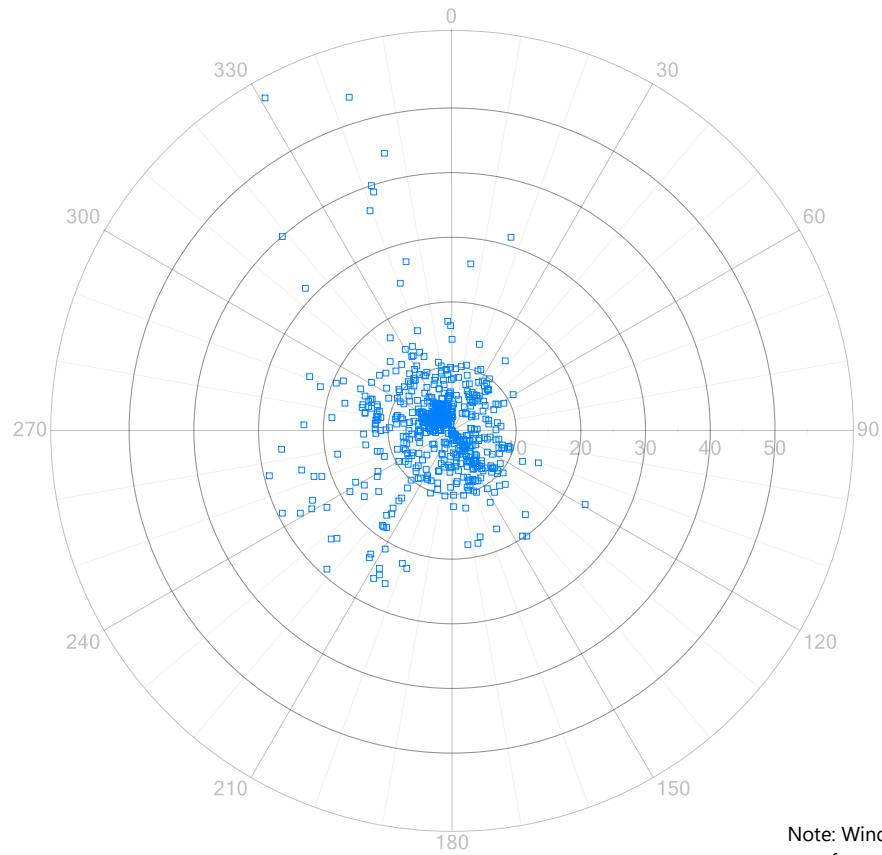
Figure 5: North E-Sampler PM<sub>10</sub> Scatter Plot 1 Hour Averages

### East E-Sampler PM<sub>10</sub> Scatter Plot

Polar Scatter

July 2019

□ PM<sub>10</sub> 1hr Avg (µg/m<sup>3</sup>)



81.6% valid data present

Note: Wind Data supplied from the Met Station

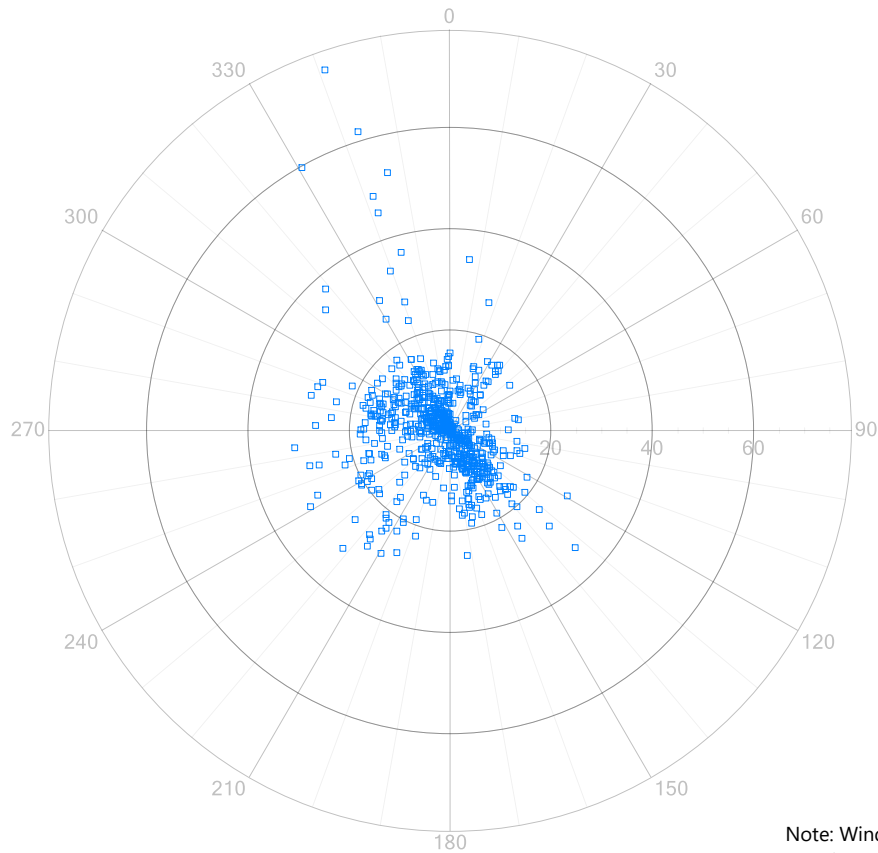
Figure 6: East E-Sampler PM<sub>10</sub> Scatter Plot 1 Hour Averages

### South E-Sampler PM<sub>10</sub> Scatter Plot

Polar Scatter

□ PM<sub>10</sub> 1hr Avg (µg/m<sup>3</sup>)

July 2019



99.9% valid data present

Note: Wind Data supplied from the Met Station

Figure 7: South E-Sampler PM<sub>10</sub> Scatter Plot 1 Hour Averages

### Exactus BAM PM<sub>10</sub>

July 2019

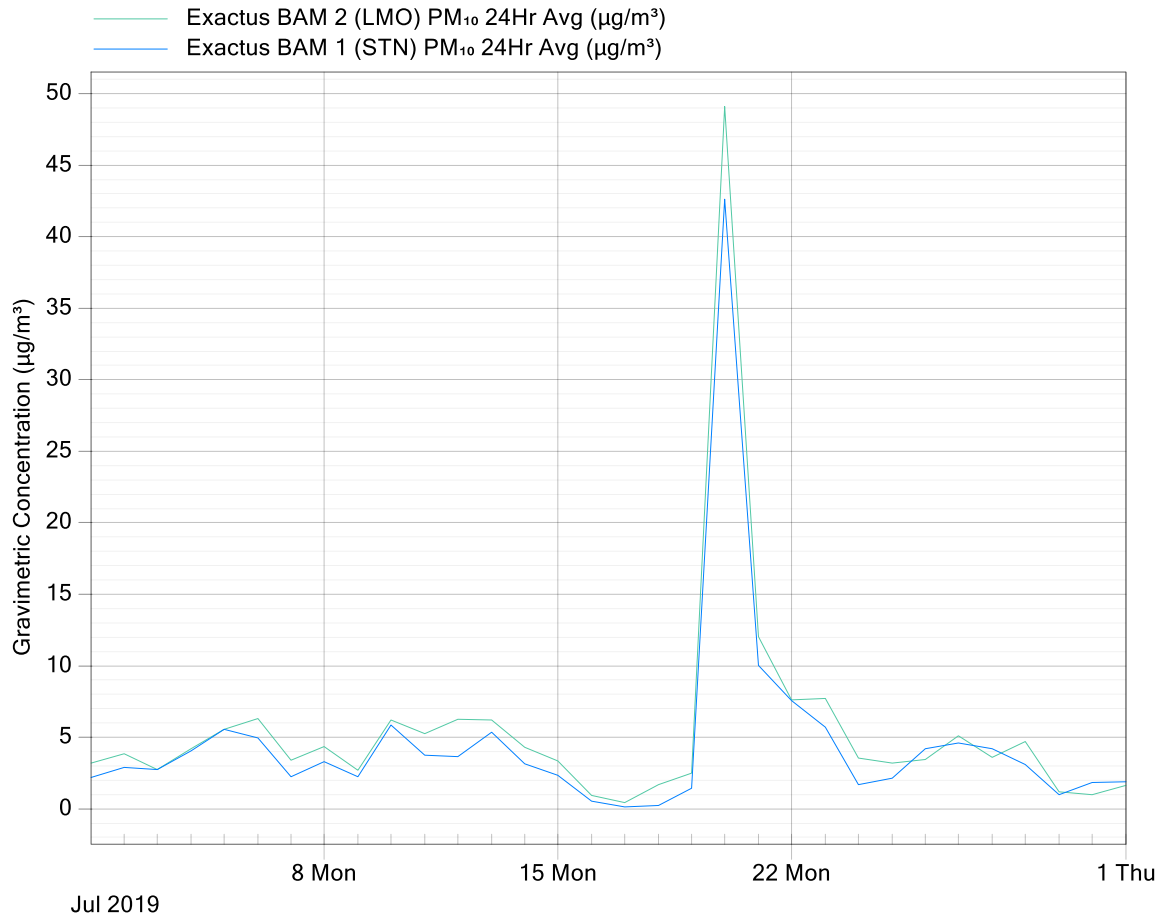


Figure 8: Exactus BAM 1 (STN) and 2 (LMO) PM<sub>10</sub> 24 Hour Averages

### E-Sampler PM<sub>10</sub>

July 2019

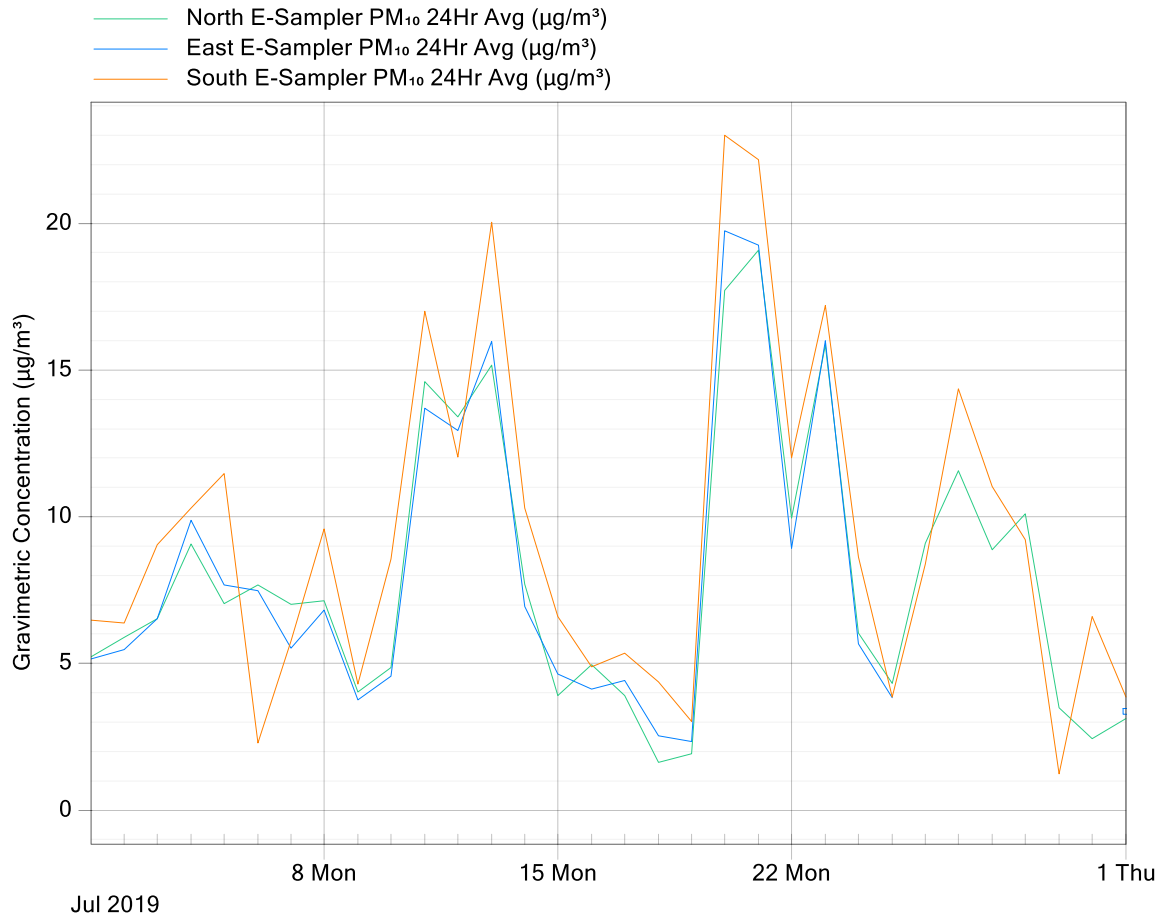


Figure 9: North E-Sampler, East E-Sampler, and South E-Sampler PM<sub>10</sub> 24 Hour Averages



Met Station AT  
July 2019

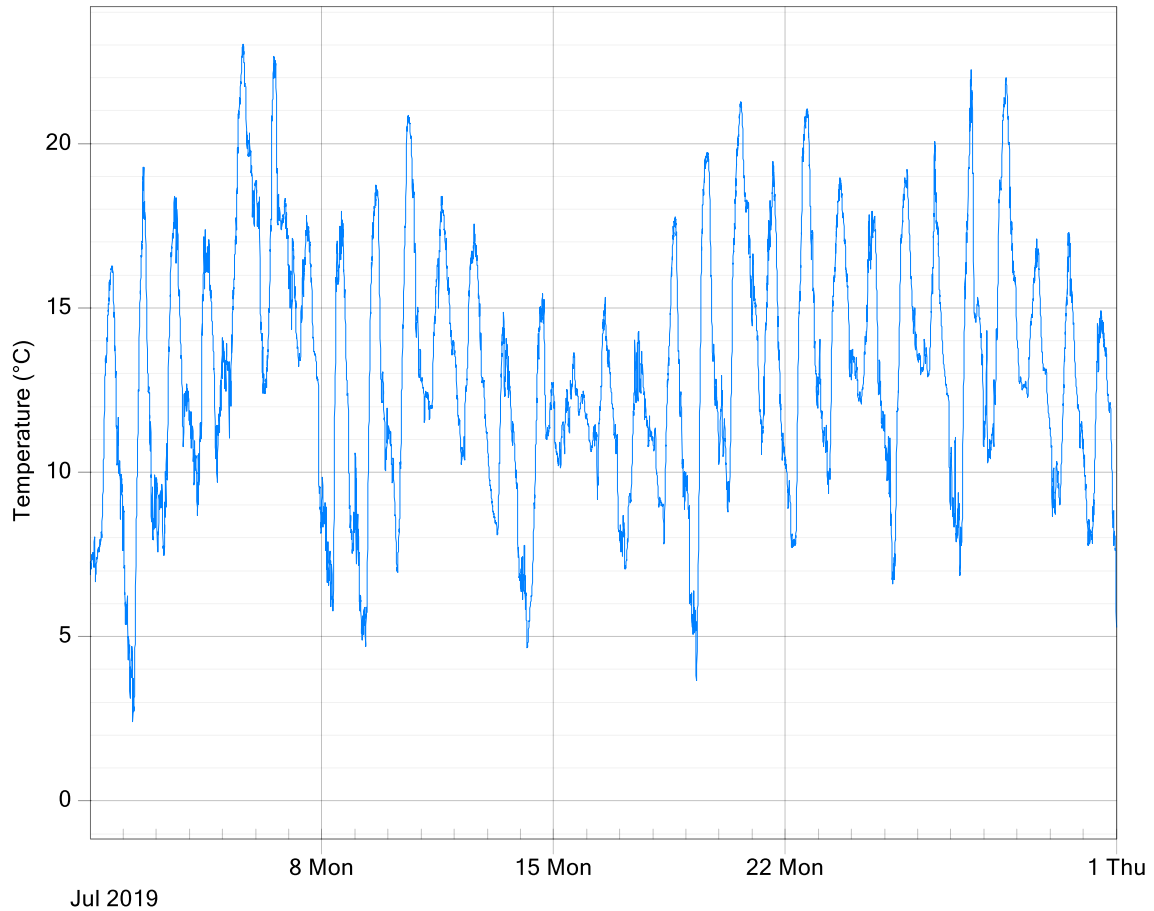


Figure 10: Met Station Ambient Temperature 5 Minute Averages

### Met Station RH

July 2019

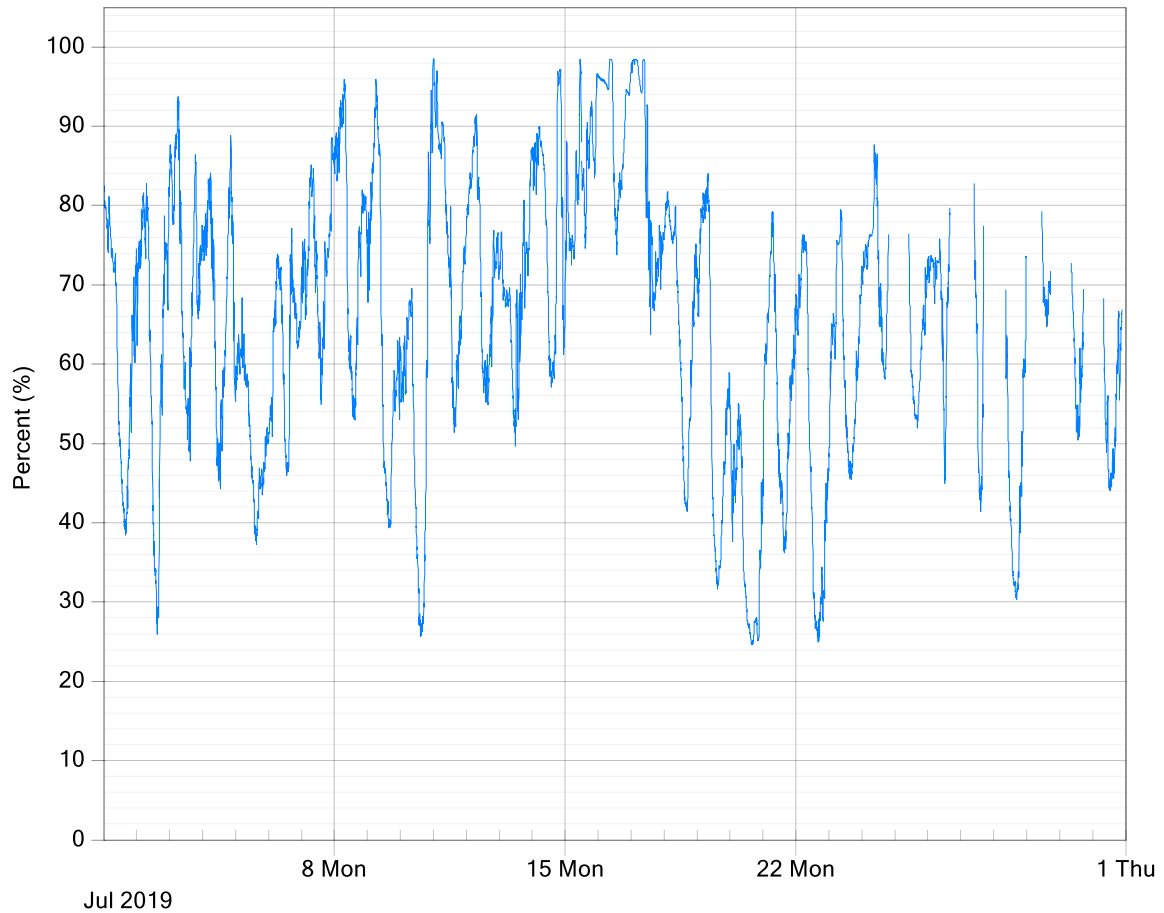


Figure 11: Met Station Relative Humidity 5 Minute Averages

### Met Station Rain

July 2019

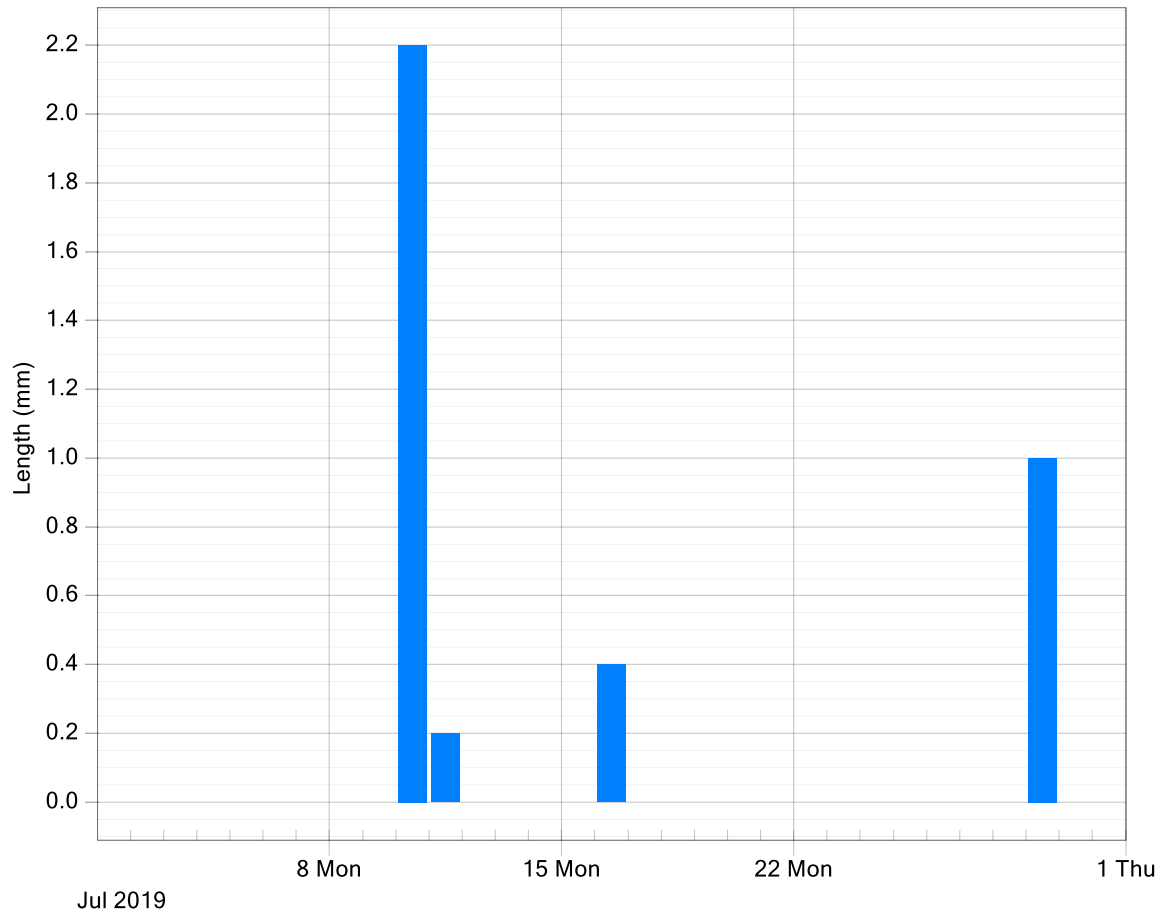


Figure 12: Met Station Rainfall 24 Hour Data

### 5.0 Valid Data Exception Tables

The tables below detail all changes made to the raw data set during the validation process. An explanation of reasons given in the table can be found in Appendix 2.

**Table 9: Exactus BAM 1 (STN) Valid Data Exception Table**

Start Date	End Date	Reason	Change Details	User Name	Change Date
01/07/19 12:15	31/07/19 13:15	Intermittent data outside calibrated range of instrument	PM <sub>10</sub> RT	DL	21/08/19
23/07/19 16:00	23/07/19 18:00	Scheduled monthly maintenance followed by instrument stabilisation	All channels	DL	21/08/19

**Table 10: Exactus BAM 2 (LMO) Valid Data Exception Table**

Start Date	End Date	Reason	Change Details	User Name	Change Date
01/07/19 09:15	31/07/19 23:15	Intermittent data outside calibrated range of instrument	PM <sub>10</sub> RT	DL	21/08/19
23/07/19 14:30	23/07/19 16:15	Scheduled monthly maintenance followed by instrument stabilisation	All channels	DL	21/08/19

**Table 11: North E-Sampler Valid Data Exception Table**

Start Date	End Date	Reason	Change Details	User Name	Change Date
23/07/19 13:50	23/07/19 14:05	Scheduled monthly maintenance followed by instrument stabilisation	PM <sub>10</sub>	DL	21/08/19

**Table 12: East E-Sampler Valid Data Exception Table**

Start Date	End Date	Reason	Change Details	User Name	Change Date
23/07/19 12:30	23/07/19 12:45	Scheduled monthly maintenance followed by instrument stabilisation	PM <sub>10</sub>	DL	21/08/19
25/07/19 20:35	31/07/19 11:30	Station offline due to stolen solar panel	PM <sub>10</sub>	DL	21/08/19
31/07/19 11:35	31/07/19 11:35	Power restored followed by instrument stabilisation	PM <sub>10</sub>	DL	21/08/19

**Table 13: South E-Sampler Valid Data Exception Table**

Start Date	End Date	Reason	Change Details	User Name	Change Date
23/07/19 12:20	13/07/19 12:20	Data gap	PM <sub>10</sub>	DL	21/08/19
23/07/19 13:05	13/07/19 13:25	Scheduled monthly maintenance followed by instrument stabilisation	PM <sub>10</sub>	DL	21/08/19

**Table 14: Met Station Valid Data Exception Table**

Start Date	End Date	Reason	Change Details	User Name	Change Date
23/07/19 11:30	23/07/19 11:30	Scheduled monthly maintenance	Rain	DL	21/08/19
24/07/19 19:35	01/08/19 00:00	Intermittent instrument fault - Readings not tracking with other sites at high range	RH	DL	21/08/19

---

## 6.0 Report Summary

- Percentage availability for PM<sub>10</sub> at Exactus BAM 1 (STN) and Exactus BAM 2 (LMO) stations was above 95% for the reporting month.
- Percentage availability for PM<sub>10</sub> at most E-sampler stations was above 95% for the reporting month with the exception of East E-sampler instrument which was offline between 25<sup>th</sup> and 31<sup>st</sup> of July 2019 due to the solar panel being stolen.
- Percentage availability for all parameters at the met station was above 95% for the reporting month, except for RH sensor which affected by intermittent instrument fault – readings not tracking with other sites at under humid conditions.
- For more details regarding data exceptions, refer to Tables 8, and 9-14.

-----END OF REPORT-----

---

## Appendix 1 - Definitions & Abbreviations

°C	Degrees Celsius
µg/m <sup>3</sup>	Micrograms per cubic metre at standard temperature and pressure (0°C and 101.3 kPa)
AT	Ambient Temperature
calm	Wind conditions where the wind speed is below the operating range of the wind sensor
deg	Degrees (True North)
LDL	Lower Detectable Limit
m/s	Metres per second
PM <sub>10</sub>	Particulate less than 10 microns in equivalent aerodynamic diameter
RH	Relative Humidity
PM <sub>10</sub> RT	PM <sub>10</sub> Realtime
Sigma	Sigma Theta is the standard deviation of the horizontal wind direction fluctuations over the averaging period.
WD	Vector Wind Direction
WS	Vector Wind Speed

## Appendix 2 - Explanation of Exception Table

**Automatic filter tape advance** refers to the movement of the filter paper by the analyser to an unused spot.

**Automatic span/zero check.** The E-Sampler is programmed to perform a zero calibration check whereby air is passed through filter element, removing particulates, before entering the sensor in the analyser. Data is invalidated when these checks occur.

**Beta count failure** refers to a fault in the functioning of the EBAM. A 1 minute beta count was less than the maximum acceptable counts during operation.

**Calibration correction factor applied to data** refers to an offset or multiplier applied to the data. This operation may be performed for a number of reasons including: (a) when a clear trend / drift outside the tolerance limit can be demonstrated by repeated operation precision checks, (b) when a correction is required on previously logged data due to a calibration check being outside the allowable tolerance

**Commissioning** refers to the initial setup and calibration of the instrument when it is first installed. For some instruments there may be a stabilisation period before normal operation commences.

**Data affected by environmental conditions – wind speed / wind speed gust spike** refers to when a one-off high reading occurs due to a natural occurrence such as a bird sitting on the wind sensor, or some other event causing the readings to spike.

**Data transmission error** refers to a period of time when the instrument could not transmit data. This may be due to interference, or a problem with the phone line or modem.

**Equipment malfunction/instrument fault** refers to a period of time when the instrument was not in the normal operating mode and did not measure a representative value of the existing conditions.

**Gap in data/data not available** refers to a period of time when either data has been lost or could not be collected.

**Instrument Alarm** refers to an alarm produced by the instrument. A range of alarms can be produced depending on how operation of the instrument is being affected.

**Instrument out of service** refers to a lack of data due to an instrument being shut down for repair, maintenance, or factory calibration.



**Linear offset or multiplier** refers to when an offset or multiplier has been applied between two points where the values of the offset or multiplier are different and the correction is interpolated between the two points.

**Logger error** refers to when an error occurs and instrument readings are not correctly recorded by the logger.

**Maintenance** refers to a period of time when the logger / instrument was switched off due to maintenance.

**Power Interruption** refers to no power to the station therefore no data was collected at this time.

**Stabilisation following power interruption** refers to the start up period of an instrument after power has been restored.

**Tape break** refers to the breaking of the EBAM/BAM sample tape during operation.