Quarterly Data Report

Cheltenham Borough Council

January, February, March 2021

Table Of Contents

Cheltenham 1150100 - Site Information

The Cheltenham monitoring station is located in a roadside cabin near A40 Gloucester road.

UK-AIR ID: None

EU Site ID: None

Environment Type: Urban Traffic

Altitude (metres): None

Site Address: 18 Gloucester Road, Cheltenham

Government Region: Cheltenham

Easting/Northing: 560963.89, 5749904.91

Latitude/Longitude: 51.896565, -2.114000

Site location URL: https://goo.gl/maps/196QLfK1iYj5AjDd9

AQMesh Devices in Cheltenham

9 AQMesh devices have been installed at various locations after co-location study, scaling factors (slope and offset) generated by co-location study during first quarter 2021 have been retrospectively applied to each AQMesh device's historical data channels from 01 January 2020 to present. The following AQMesh and reference station data summary is using scaled data at raw data rate exported from www.airmonitors.net. Gaseous pollutant mass units are at 20 °C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. AQMesh data shown in this report are based on location, different AQMesh devices could be installed at the same location during different time periods.

AQMesh Statement

AQMesh is a multi-parameter small sensor system. When operated according to manufacturer's guidance and best practice the devices should provide reasonably accurate results "out of the box". Accuracy can be further improved by either physical co-location with Reference (or Equivalence) grade monitors or Acoem's network smart calibration methods and subsequent adjustment of calibration parameters. AQMesh devices, once calibrated, can provide accuracy close to that of a Reference for Equivalence monitor, but we recommend that AQMesh data alone should not be relied upon for compliance with EU or UK air quality directives.

ACOEM UK Ground Floor Offices, C1 The Courtyard, Tewkesbury Business Park, Tewkesbury, GL20 8GD
enquire.airmonitors@acoem.com www.acoem.co.uk

Air Monitors is part of the ACOEM Group

3

AQMesh Status Flags

Flag	Description of when the status flag appears
Below Level Of Detection	The AQMesh reading is under the level of detection listed in the specification sheet.
Stabilising	AQMesh is running automatic self stabilising which is usually 2 days in duration. This occurs when AQMesh is switched on for the first time and after gas sensor replacement.
Rebasing	AQMesh is running automatic self rebasing on gas sensors which usually lasts 2-5 days. This occurs when AQMesh is switched on for the first time and after gas sensor replacement. There is no data when this flag is present.
Rebased	This status flag replaces the rebasing status flag once AQMesh finishes rebasing, the readings during the rebasing process are retrospectively populated with the rebased status flag.
Optimising	Occurs when a pod is power-cycled for more than an hour i.e. Maintenance or power failure.
Communication Error	AQMesh is unable to upload data successfully. This status will require investigation.
Failed Sensor	AQMesh gas sensor has been determined as failed and requires a replacement sensor to be installed.
Cross Gas Error	This status flag appears when a sensor fails which is relied upon for the removal or interferences on another sensor, e.g. NO_2 sensor failure will affect O_3 reading. O_3 readings are then marked with the Cross Gas Error status flag.
Destabilised	The system has detected that the sensor may be compromised due to odd fluctuations in temperature and pressure.
Extreme Environment	This status flag appears when the manufacturer determines the combination of extremes in climate in which the electrochemical sensors do not provide consistent outputs. As such precise and accurate measurements are not possible.
Condensation	The NDIR sensor is affected by condensation on the detector. This flag is exclusive to CO_2 data.
Deliquescence	This status flag appears when not using the heated inlet option. Outlying data points caused by hygroscopic particle size growth will be flagged following analysis of the particle count distribution. This flag is exclusive to PM data.

ACOEM UK Ground Floor Offices, C1 The Courtyard, Tewkesbury Business Park, Tewkesbury, GL20 8GD
enquire.airmonitors@acoem.com www.acoem.co.uk

Air Monitors is part of the ACOEM Group

4

Misread	Occurs when the particle counter misreads. It is exclusive to PM data.
Greater Than Upper Limit	Occurs when the reading is above the device measurement range.
Greater Than Concentration Limit	This status flag appears when data is above the concentration limit, set for ambient air measurement.
Less Than Concentration Limit	This status flag appears when data is lower than the device concentration limit, set for ambient air measurement.
Less Than Lower Limit	This status flag appears when reading is lower than the device measurement range.
PM_1 Greater Than $PM_{2.5}$	Prescaled PM_1 readings are higher than $PM_{2.5}$ readings.
PM_1 Greater Than PM_{10}	Prescaled PM_1 readings are higher than PM_{10} readings.
$PM_{2.5}$ Greater Than PM_{10}	Prescaled $PM_{2.5}$ readings are higher than PM_{10} readings.
Depletion Event	This status flag appears when there is abundant NO_x level in the air and AQMesh reports negative O_3 levels. O_3 readings should be considered and truncated to zero under this status flag.
Calibration	Device is under a calibration process.
Unknown Error	AQMesh encounters an unknown error. This is usually caused by a hardware related problem and requires further investigation.

ACOEM UK Ground Floor Offices, C1 The Courtyard, Tewkesbury Business Park, Tewkesbury, GL20 8GD
enquire.airmonitors@acoem.com www.acoem.co.uk

Air Monitors is part of the ACOEM Group

5

Upper Limit, Lower Limit and Concentration Limit

This table shows the upper limit, lower limit and concentration limits that are set for AQMesh measured pollutants. The status flags "Greater Than Upper Limit", "Greater Than Concentration Limit", "Less Than Concentration Limit" and "Less Than Lower Limit" in the data summary are determined by values in this table.

AQMesh channels	Upper limit	High concentration limit	Low concentration limit	Lower limit	Unit
NO	1000	800	-5	-100	ppb
NO$_2$	1000	300	-5	-100	ppb
PM$_{10}$	3000	None	None	-100	µg m^{-3}
PM$_{2.5}$	3000	None	None	-100	µg m^{-3}
PM$_1$	1000	None	None	-100	µg m^{-3}

Glossary

Data Capture Rate- The amount of data captured as a percentage of the total possible in any period.

Valid Data Rate - The proportion of data considered valid after any invalid Status Flags have been considered and any Outliers have been removed.

Outliers - Data points which have been removed from a data set other than by predetermined Status Flags by a manually applied ratification process.

Status Flag - A marker applied to each data point based on a number of predetermined conditions which describe a condition which may render the data valid or invalid.

Pre-Scaled Data - Data which has not (yet) been subject to offset or slope adjustments as a result of a Calibration Process.

Scaled Data - Pre-Scaled data which has been subsequently adjusted by application of an offset and/or slope determined by a Calibration Process.

Reference - Data generated by a certified monitor complying with the requirements of an EU, UK or US Reference method.

Equivalence - A monitor which has been certified Equivalent to a EU, UK or US Reference Method according to the relevant Guidance on Equivalence Designation.

Co-location Study - A process of comparing data from a candidate sensor device with that of a Reference (or Equivalent) monitor for a period of time at a fixed location.

Sensor Calibration Process - A Co-location Study where a candidate sensor or sensor system is compared with a Reference (or Equivalence) grade monitor for a period of time and the candidate data is adjusted by application of an offset and/or slope in order to improve the level of agreement with the reference data source.

Scale Separation - A process of separating the local and regional concentration signals for an observed pollutant species within a network of sensors.

Network Calibration process - A Calibration Process applied to a group of sensors within a specified geographical area, using a common (regional) signal from ambient air as derived by a Scale Separation technique.

Emissions Indices - The amount of a criteria pollutant produced (or emitted) expressed as a percentage of the amount of fuel combusted. This is normally calculated as a ratio of the criteria pollutant concentration over that of CO_2.

Criteria Air Pollutant - A gaseous, particulate matter, aerosol or vapour consisting of a material designated as a controlled air pollutant within an EU, UK or US Air Quality Directive.

API (Application Program Interface) - A protocol allowing manual or automated, third party queries of data within a database and returning a predetermined response format. e.g. (JSON, CSV etc)

Relative Concentration - The concentration of an airborne pollutant expressed as ppb, ppm, etc

Absolute Concentration - The concentration of an airborne pollutant expressed in mg/m^3, ug/m^3, $mole/m^3$ etc.

OpenAir - A set of data analysis tools using advanced data processing in "R"

"R" - R is a programming language and free software environment for statistical computing and graphics supported by the R Foundation for Statistical Computing. The R language is widely used among statisticians and data miners for developing statistical software and data analysis.

ACOEM UK Ground Floor Offices, C1 The Courtyard, Tewkesbury Business Park, Tewkesbury, GL20 8GD
enquire.airmonitors@acoem.com www.acoem.co.uk

Air Monitors is part of the ACOEM Group

7

January - March 2021 Data summary

1150100 Cheltenham reference site - Data Summary
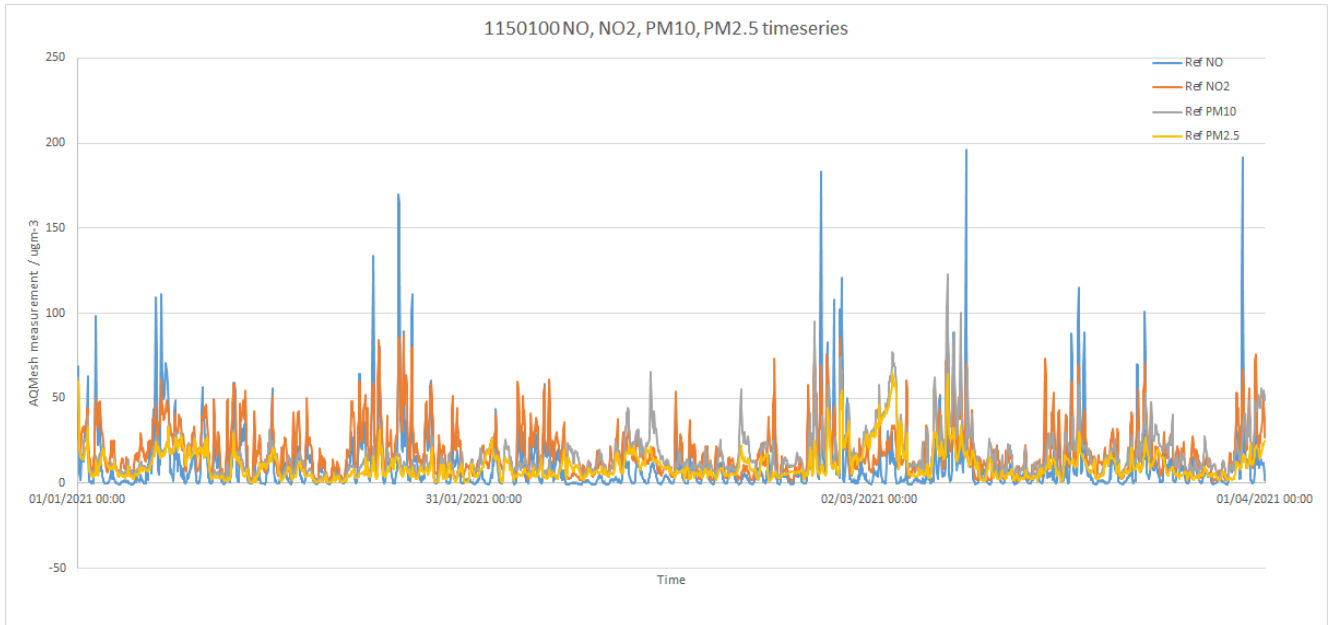
(Graph shows hourly averaged data)

This reference site has Thermo 42i NOx analyser and Palas Fidas PM analyser installed.

NO valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Data capture rate	100.00%	97.47%	99.97%	None
Max	231.10	219.50	258.60	µg m^{-3}
Min	-0.70	-0.70	-0.60	µg m^{-3}
Median	5.60	3.60	4.50	µg m^{-3}
Monthly mean	13.85	9.51	10.23	µg m^{-3}
NO invalid data status flag				
	None	None	Communication error	

(Min, Max & Median based on 15 minute data)

NO₂ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Data capture rate	100.00%	97.47%	99.97%	None
Max	105.50	98.60	91.60	$\mu g\ m^{-3}$
Min	1.10	0.40	-1.70	$\mu g\ m^{-3}$
Median	18.00	12.60	14.40	$\mu g\ m^{-3}$
Monthly mean	22.37	16.85	18.99	$\mu g\ m^{-3}$
NO₂ invalid data status flag				
	None	None	Communication error	

(Min, Max & Median based on 15 minute data)

Note: There is no gas data present on February 2nd 2021 from 06:15 - 23:00

PM₁₀ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Data capture rate	100.00%	100%	99.97%	None
Max	66.43	124.99	150.59	$\mu g\ m^{-3}$
Min	0.22	0.57	1.53	$\mu g\ m^{-3}$
Median	9.90	12.05	17.36	$\mu g\ m^{-3}$
Monthly mean	11.49	15.42	21.39	$\mu g\ m^{-3}$
PM₁₀ invalid data status flag				
	None	None	Communication error	

(Min, Max & Median based on 15 minute data)

PM$_{2.5}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Data capture rate	100.00%	100%	99.97%	None
Max	63.52	63.71	73.10	µg m^{-3}
Min	0.18	0.48	0.99	µg m^{-3}
Median	6.93	7.00	9.19	µg m^{-3}
Monthly mean	8.93	9.37	12.62	µg m^{-3}
PM$_{2.5}$ invalid data status flag				
	None	None	Communication error	

(Min, Max & Median based on 15 minute data)

NOTE: Negative reading shown in the above tables are genuine data from the reference instrument. Negative values could be the noise readings when ambient pollution level is very low.

College Rd AQMesh - Data Summary
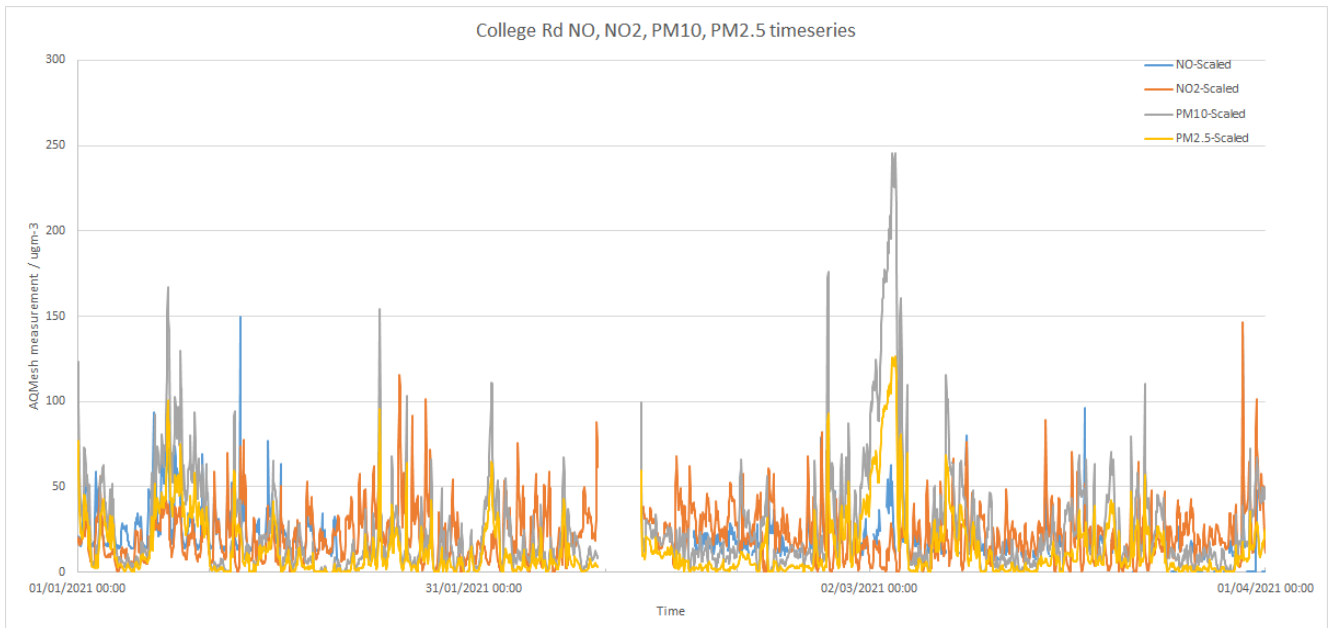
(Graph shows hourly averaged data)

NO valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	63.78%	38.38%	52.18%	None
Max	170.60	165.30	152.90	µg m^{-3}
Min	2.20	5.40	5.40	µg m^{-3}
Median	21.75	15.50	14.50	µg m^{-3}
Monthly mean	26.81	18.24	18.46	µg m^{-3}
NO invalid data status flag:				
	Failed Sensor Greater Than Upper Limit	Failed Sensor Stabilising,Comm Error Stabilising Rebasing Less Than Concentration Limit	Less Than Concentration Limit	

(Min, Max & Median based on 15 minute data)

NO₂ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	98.69%	97.98%	97.08%	None
Max	123.00	148.10	152.70	µg m⁻³
Min	0.00	0.00	0.00	µg m⁻³
Median	17.40	23.00	16.90	µg m⁻³
Monthly mean	21.32	24.86	20.11	µg m⁻³
NO₂ invalid data status flag				
	Truncation	Optimising Truncation	Truncation	

(Min, Max & Median based on 15 minute data)

PM₁₀ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	88.03%	96.26%	100.00%	None
Max	869.48	1171.93	1126.96	µg m⁻³
Min	0.00	0.00	0.00	µg m⁻³
Median	12.46	13.74	17.75	µg m⁻³
Monthly mean	23.26	19.84	32.76	µg m⁻³
PM₁₀ invalid data status flag				
	Deliquescence Truncation	Truncation	Truncation	

(Min, Max & Median based on 1 minute data)

PM$_{2.5}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	86.67%	94.55%	89.37%	None
Max	542.45	542.76	463.78	µg m^{-3}
Min	0.00	0.00	0.00	µg m^{-3}
Median	6.25	4.53	7.50	µg m^{-3}
Monthly mean	13.58	8.94	16.80	µg m^{-3}
PM$_{2.5}$ invalid data status flag				
	Deliquescence Truncation	Truncation	Truncation	

(Min, Max & Median based on 1 minute data)

Gloucester Rd school AQMesh - Data Summary
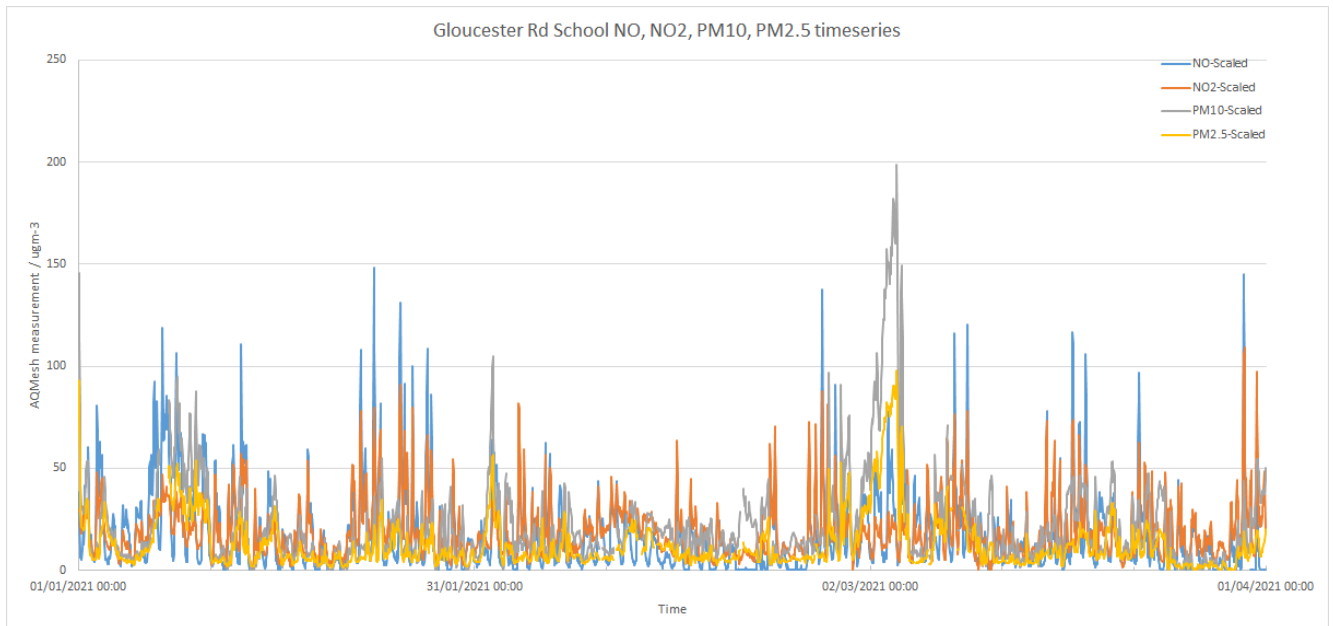
(Graph shows hourly averaged data)

Note: The following tables exclude data measured during the co-location period.

NO valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	92.84%	86.05%	90.89%	None
Max	173.70	163.60	181.90	µg m⁻³
Min	0.00	0.00	0.00	µg m⁻³
Median	14.20	8.30	11.35	µg m⁻³
Monthly mean	22.59	13.65	17.43	µg m⁻³
NO invalid data status flag				
	Truncation	Truncation	Truncation Less Than Concentration Limit	

(Min, Max & Median based on 15 minute data)

NO$_2$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	99.83%	99.93%	99.36%	None
Max	99.40	110.10	134.10	µg m^{-3}
Min	0.00	0.00	0.00	µg m^{-3}
Median	16.20	15.50	15.10	µg m^{-3}
Monthly mean	20.13	18.80	19.16	µg m^{-3}
NO$_2$ invalid data status flag				
	Truncation	Truncation	Truncation Optimising	

(Min, Max & Median based on 15 minute data)

PM$_{10}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	96.70%	99.57%	91.64%	None
Max	508.37	280.53	584.92	µg m^{-3}
Min	0.00	0.00	0.00	µg m^{-3}
Median	12.71	15.41	16.63	µg m^{-3}
Monthly mean	19.84	19.00	27.21	µg m^{-3}
PM$_{10}$ invalid data status flag				
	Deliquescence Truncation	Deliquescence Truncation	Deliquescence Truncation Unknown Error	

(Min, Max & Median based on 1 minute data)

PM$_{2.5}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	99.83%	99.77%	99.21%	None
Max	351.66	141.55	361.75	µg m^{-3}
Min	1.25	1.72	0.00	µg m^{-3}
Median	8.16	7.24	8.61	µg m^{-3}
Monthly mean	12.99	10.17	14.71	µg m^{-3}
PM$_{2.5}$ invalid data status flag				
	Deliquescence	Deliquescence Truncation	Deliquescence Truncation Unknown Error	

(Min, Max & Median based on 1 minute data)

Berkeley Place AQMesh - Data Summary
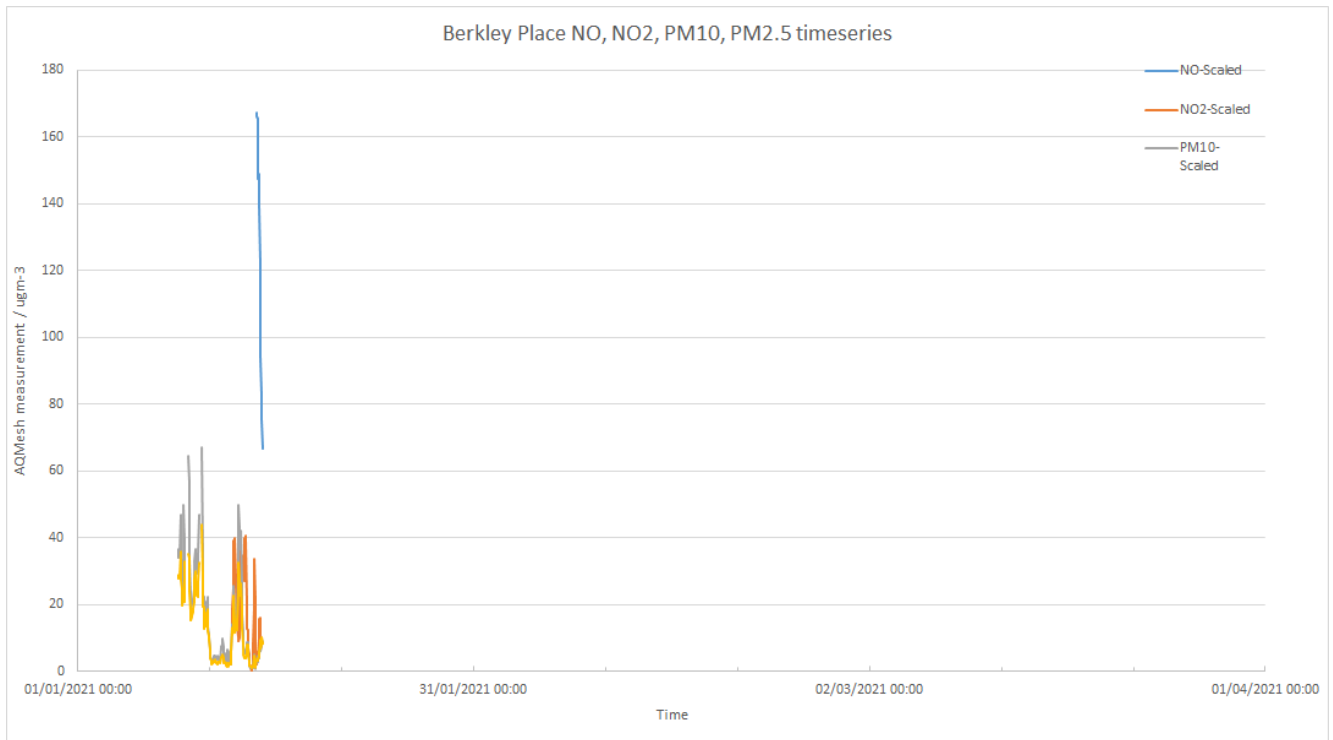
(Graph shows hourly averaged data)

Note: The following tables exclude data measured during the co-location period.

NO valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	7.79%	None	None	None
Max	170.80	None	None	µg m^{-3}
Min	61.20	None	None	µg m^{-3}
Median	129.45	None	None	µg m^{-3}
Monthly mean	123.32	None	None	µg m^{-3}
NO invalid data status flag				

ACOEM UK Ground Floor Offices, C1 The Courtyard, Tewkesbury Business Park, Tewkesbury, GL20 8GD
enquire.airmonitors@acoem.com www.acoem.co.uk

Air Monitors is part of the ACOEM Group

17

	Rebasing Stabilising Stabilising, Comms error Truncation	None	None	

(Min, Max & Median based on 15 minute data)

NO₂ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	36.36%	None	None	None
Max	56.40	None	None	$\mu g\ m^{-3}$
Min	0.00	None	None	$\mu g\ m^{-3}$
Median	13.50	None	None	$\mu g\ m^{-3}$
Monthly mean	17.31	None	None	$\mu g\ m^{-3}$
NO₂ invalid data status flag				
	Rebasing Stabilising Stabilising, Comms error Truncation	None	None	

(Min, Max & Median based on 15 minute data)

PM₁₀ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	97.40%	None	None	None
Max	96.33	None	None	$\mu g\ m^{-3}$
Min	0.75	None	None	$\mu g\ m^{-3}$
Median	9.56	None	None	$\mu g\ m^{-3}$
Monthly mean	17.19	None	None	$\mu g\ m^{-3}$
PM₁₀ invalid data status flag				
	Deliquescence	None	None	

(Min, Max & Median based on 15 minute data)

PM$_{2.5}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	97.40%	None	None	None
Max	53.30	None	None	µg m^{-3}
Min	1.00	None	None	µg m^{-3}
Median	8.70	None	None	µg m^{-3}
Monthly mean	12.90	None	None	µg m^{-3}
PM$_{2.5}$ invalid data status flag				
	Deliquescence	None	None	

(Min, Max & Median based on 15 minute data)

(ACOEM logo)

Winchcombe Street (Fairview) AQMesh - Data Summary
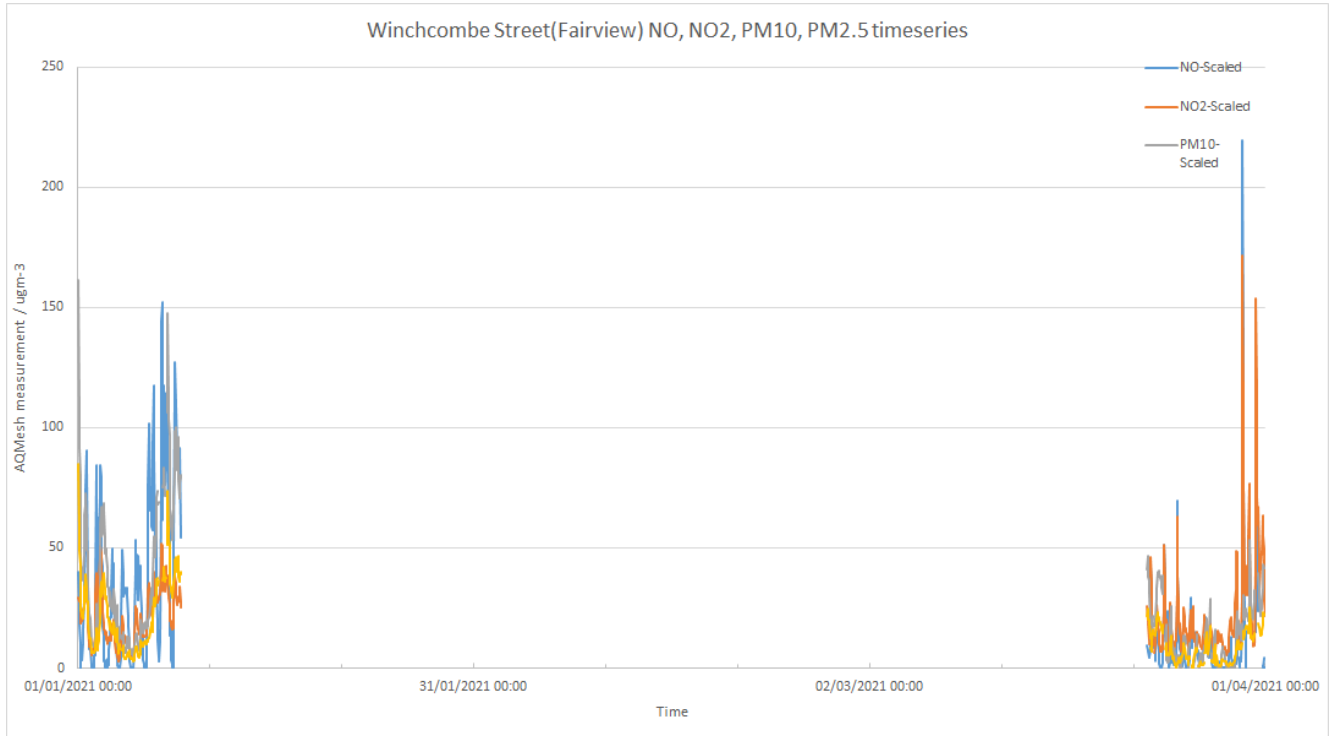
(Graph shows hourly averaged data)

Note: The following tables exclude data measured during the co-location period between.

NO valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	89.89%	None,device offline	72.71%	None
Max	201.70	None,device offline	346.90	µg m^{-3}
Min	0.00	None,device offline	0.00	µg m^{-3}
Median	27.05	None,device offline	4.80	µg m^{-3}
Monthly mean	37.41	None,device offline	11.50	µg m^{-3}
NO invalid data status flag				
	Truncation	None	Less Than Concentration Limit Truncation	

(Min, Max & Median based on 15 minute data)

NO$_2$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	100%	None,device offline	99.77%	None
Max	60.50	None,device offline	233.00	µg m^{-3}
Min	1.80	None,device offline	0.50	µg m^{-3}
Median	19.65	None,device offline	14.90	µg m^{-3}
Monthly mean	21.44	None,device offline	21.94	µg m^{-3}
NO$_2$ invalid data status flag				
	None	None	Optimising	

(Min, Max & Median based on 15 minute data)

PM$_{10}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	99.80%	None,device offline	83.01%	None
Max	357.77	None,device offline	137.79	µg m^{-3}
Min	1.35	None,device offline	0.00	µg m^{-3}
Median	29.65	None,device offline	10.93	µg m^{-3}
Monthly mean	40.91	None,device offline	15.01	µg m^{-3}
PM$_{10}$ invalid data status flag				
	Deliquescence	None	Deliquescence Truncation Unknown Error	

(Min, Max & Median based on 1 minute data)

PM$_{2.5}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	99.80%	None,device offline	98.55%	None
Max	174.60	None,device offline	65.08	µg m^{-3}
Min	2.30	None,device offline	0.00	µg m^{-3}
Median	17.45	None,device offline	6.66	µg m^{-3}
Monthly mean	22.04	None,device offline	8.85	µg m^{-3}
PM$_{2.5}$ invalid data status flag				
	Deliquescence	None	Deliquescence Truncation Unknown Error	

(Min, Max & Median based on 1 minute data)

Northern End of PE Way AQMesh - Data Summary
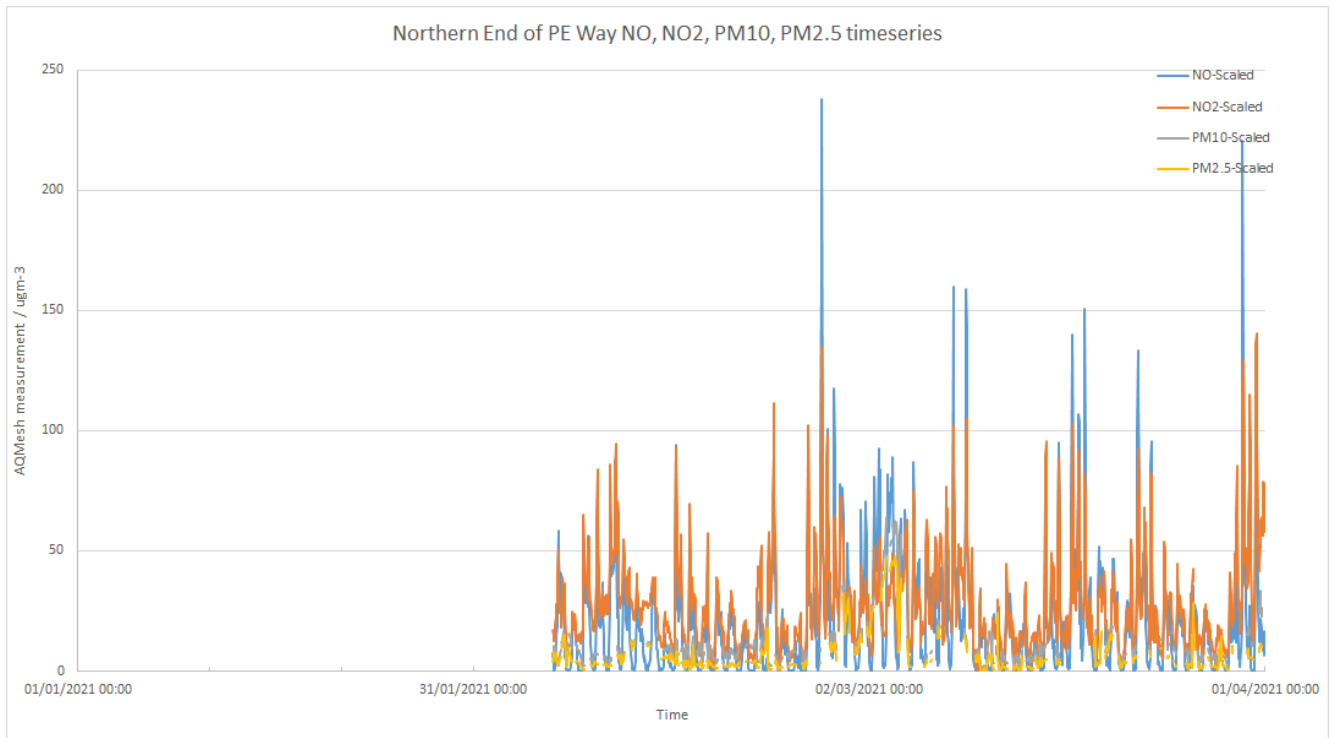
(Graph shows hourly averaged data)

Note: The following tables exclude data measured during the co-location period.

NO valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	None,device offline	74.94%	80.15%	None
Max	None,device offline	359.30	498.40	µg m^{-3}
Min	None,device offline	0.00	0.00	µg m^{-3}
Median	None,device offline	9.10	12.20	µg m^{-3}
Monthly mean	None,device offline	18.92	23.34	µg m^{-3}
NO invalid data status flag				
	None	Truncation	Truncation	

(Min, Max & Median based on 15 minute data)

NO₂ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	None,device offline	99.23%	98.30%	None
Max	None,device offline	193.20	290.40	µg m^{-3}
Min	None,device offline	0.00	0.00	µg m^{-3}
Median	None,device offline	21.50	19.90	µg m^{-3}
Monthly mean	None,device offline	27.04	27.77	µg m^{-3}
NO₂ invalid data status flag				
	None	Truncation	Less Than Concentration Limit Truncation	

(Min, Max & Median based on 15 minute data)

PM₁₀ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	None,device offline	91.55%	91.15%	None
Max	None,device offline	71.80	134.92	µg m^{-3}
Min	None,device offline	0.57	0.10	µg m^{-3}
Median	None,device offline	8.54	10.48	µg m^{-3}
Monthly mean	None,device offline	9.40	13.63	µg m^{-3}
PM₁₀ invalid data status flag				
	None	Deliquescence	Deliquescence	

(Min, Max & Median based on 1 minute data)

PM$_{2.5}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	None,device offline	91.55%	91.04%	None
Max	None,device offline	64.57	79.32	µg m^{-3}
Min	None,device offline	0.06	0.00	µg m^{-3}
Median	None,device offline	3.62	5.64	µg m^{-3}
Monthly mean	None,device offline	5.16	8.84	µg m^{-3}
PM$_{2.5}$ invalid data status flag				
	None	Deliquescence	Deliquescence Truncation	

(Min, Max & Median based on 1 minute data)

Gloucester Rd PE Way Roundabout AQMesh - Data Summary
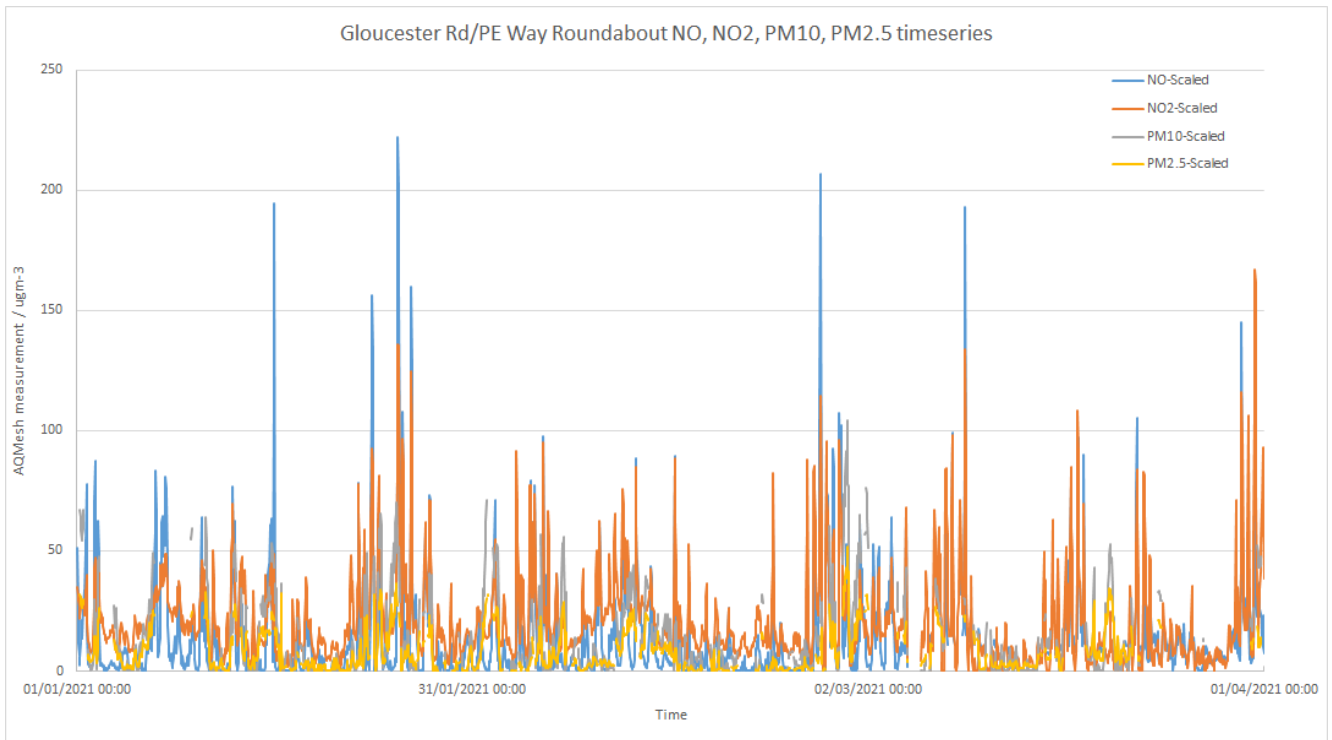
(Graph shows hourly averaged data)

Note: The following tables exclude data measured during the co-location period.

NO valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	79.60%	80.54%	71.77%	None
Max	323.80	251.90	222.40	µg m^{-3}
Min	0.00	0.00	0.00	µg m^{-3}
Median	3.40	4.00	9.80	µg m^{-3}
Monthly mean	13.20	12.46	16.34	µg m^{-3}
NO invalid data status flag				
	Truncation	Truncation	Less Than Concentration Limit Truncation	

(Min, Max & Median based on 15 minute data)

NO$_2$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	99.46%	99.07%	88.33%	None
Max	146.70	137.90	203.60	µg m^{-3}
Min	0.00	0.00	0.00	µg m^{-3}
Median	16.70	16.00	9.45	µg m^{-3}
Monthly mean	21.13	22.06	17.53	µg m^{-3}
NO$_2$ invalid data status flag				
	Truncation	Truncation	Less Than Concentration Limit Truncation	

(Min, Max & Median based on 15 minute data)

PM$_{10}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	61.57%	79.47%	68.74%	None
Max	238.23	177.59	583.60	µg m^{-3}
Min	0.00	0.00	0.00	µg m^{-3}
Median	7.49	8.67	10.41	µg m^{-3}
Monthly mean	18.53	15.34	18.19	µg m^{-3}
PM$_{10}$ invalid data status flag				
	Deliquescence Truncation	Deliquescence Truncation	Deliquescence Truncation	

(Min, Max & Median based on 1 minute data)

PM$_{2.5}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	79.10%	86.02%	87.71%	None
Max	104.45	101.86	109.38	µg m^{-3}
Min	0.00	0.00	0.00	µg m^{-3}
Median	4.71	3.59	7.07	µg m^{-3}
Monthly mean	9.55	7.39	10.58	µg m^{-3}
PM$_{2.5}$ invalid data status flag				
	Deliquescence Truncation	Deliquescence Truncation	Deliquescence Truncation	

(Min, Max & Median based on 1 minute data)

Reference Station - Gloucester Rd - Data Summary
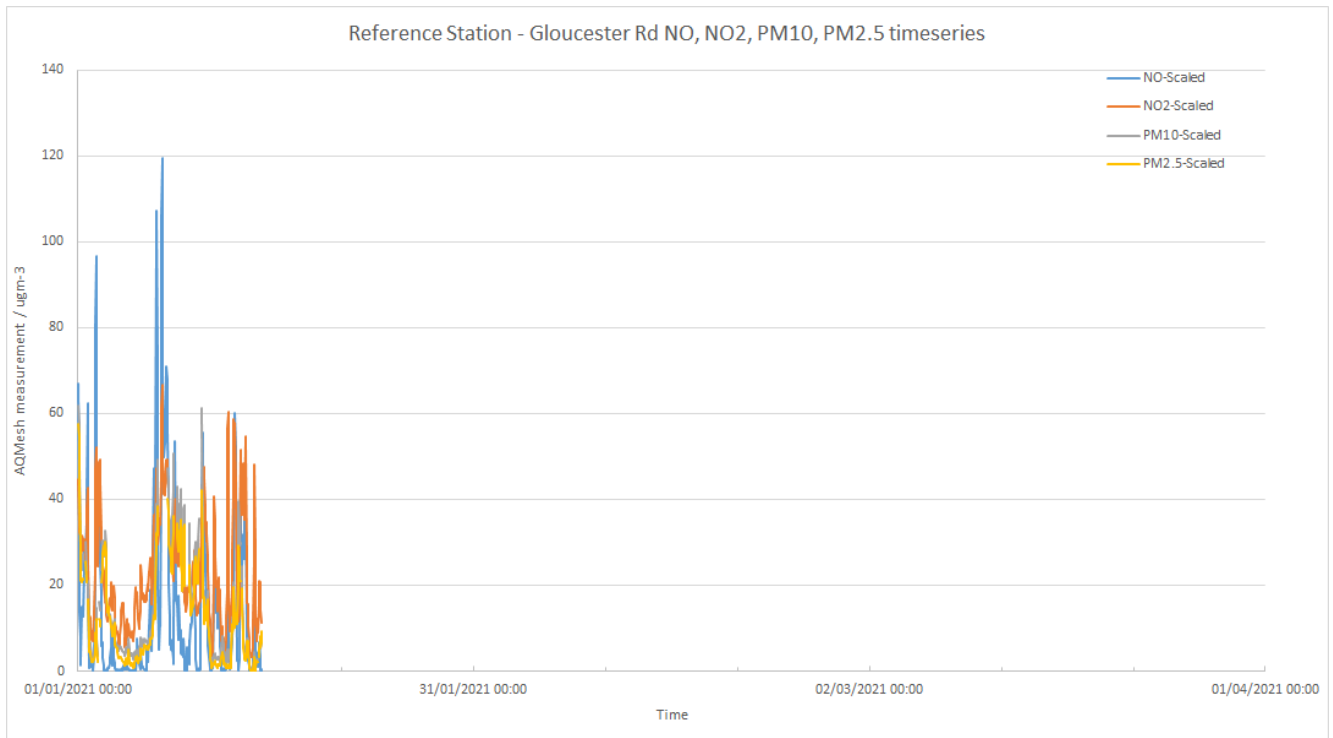
(Graph shows hourly averaged data)

Note: The following tables exclude data measured during the co-location period.

NO valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	69.66%	None	None	None
Max	282.60	None	None	µg m^{-3}
Min	0.00	None	None	µg m^{-3}
Median	5.40	None	None	µg m^{-3}
Monthly mean	15.26	None	None	µg m^{-3}
NO invalid data status flag				
	Truncation	None	None	

(Min, Max & Median based on 1 minute data)

NO$_2$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	99.56%	None	None	None
Max	117.10	None	None	µg m^{-3}
Min	0.00	None	None	µg m^{-3}
Median	19.10	None	None	µg m^{-3}
Monthly mean	22.91	None	None	µg m^{-3}
NO$_2$ invalid data status flag				
	Less Than Concentration Limit Truncation	None	None	

(Min, Max & Median based on 1 minute data)

PM$_{10}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	94.31%	None	None	None
Max	199.85	None	None	µg m^{-3}
Min	0.06	None	None	µg m^{-3}
Median	8.94	None	None	µg m^{-3}
Monthly mean	16.20	None	None	µg m^{-3}
PM$_{10}$ invalid data status flag				
	Deliquescence Truncation	None	None	

(Min, Max & Median based on 1 minute data)

ACOEM UK Ground Floor Offices, C1 The Courtyard, Tewkesbury Business Park, Tewkesbury, GL20 8GD
enquire.airmonitors@acoem.com www.acoem.co.uk

Air Monitors is part of the ACOEM Group

30

PM$_{2.5}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	92.97%	None	None	None
Max	152.86	None	None	µg m^{-3}
Min	0.00	None	None	µg m^{-3}
Median	7.70	None	None	µg m^{-3}
Monthly mean	12.84	None	None	µg m^{-3}
PM$_{2.5}$ invalid data status flag				
	Deliquescence Truncation	None	None	

(Min, Max & Median based on 1 minute data)

Southern End of PE Way AQMesh - Data Summary
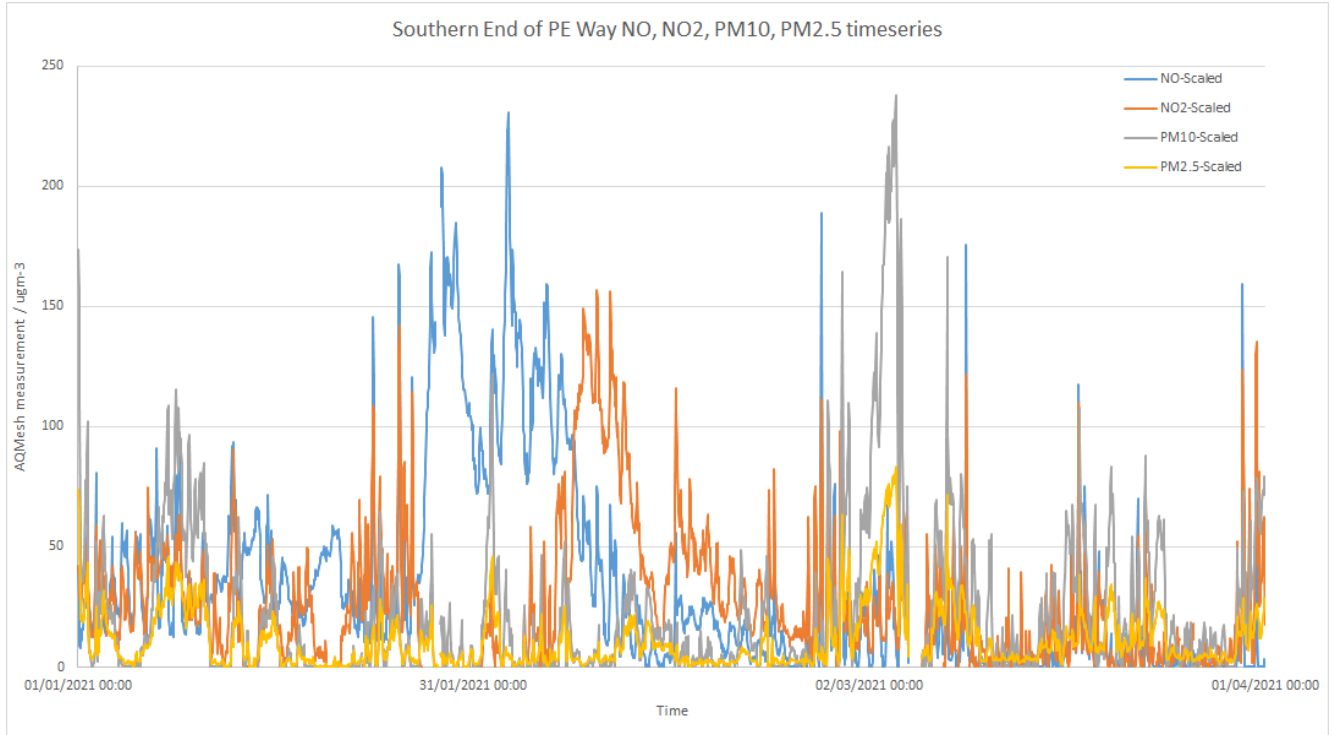
(Graph shows hourly averaged data)

Note: The following tables exclude data measured during the co-location period.

NO valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	98.89%	92.86%	68.89%	None
Max	233.30	245.20	193.80	µg m^{-3}
Min	0.00	0.00	0.00	µg m^{-3}
Median	35.80	19.50	2.20	µg m^{-3}
Monthly mean	48.78	42.33	10.04	µg m^{-3}
NO invalid data status flag				
	Less Than Concentration Limit Truncation	Truncation	Less Than Concentration Limit Truncation	

(Min, Max & Median based on 15 minute data)

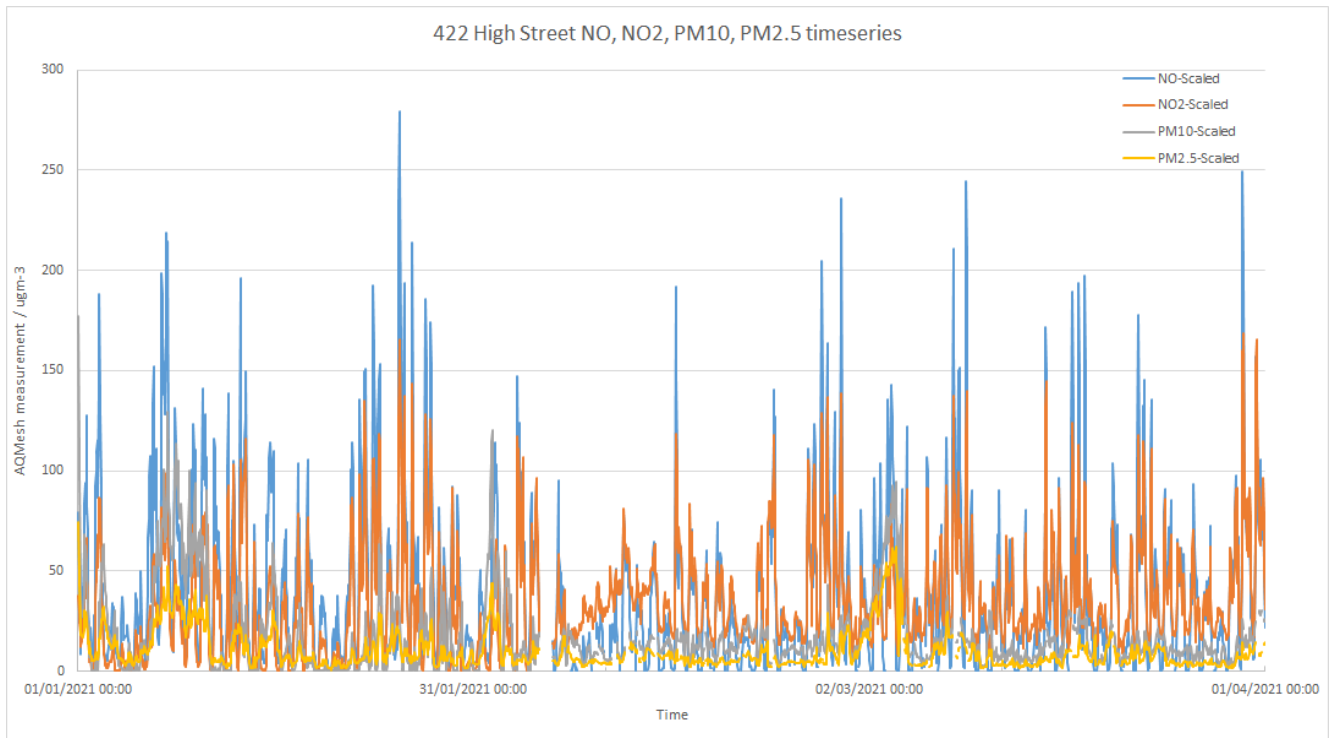| NO$_2$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	77.85%	92.49%	86.81%	None
Max	156.70	178.90	157.20	µg m^{-3}
Min	0.00	0.00	0.00	µg m^{-3}
Median	25.00	34.75	7.90	µg m^{-3}
Monthly mean	28.05	44.46	15.27	µg m^{-3}
NO$_2$ invalid data status flag				
	Less Than Concentration Limit Less than lower limit Truncation	Less Than Concentration Limit Truncation	Less Than Concentration Limit Truncation	

(Min, Max & Median based on 15 minute data)

PM$_{10}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	64.54%	72.32%	94.72%	None
Max	289.89	685.74	273.37	µg m^{-3}
Min	0.00	0.00	0.00	µg m^{-3}
Median	6.15	5.86	63.17	µg m^{-3}
Monthly mean	18.74	13.85	85.86	µg m^{-3}
PM$_{10}$ invalid data status flag				
	Unknown Error Truncation	Deliquescence Truncation	Truncation	

(Min, Max & Median based on 1 minute data)

PM$_{2.5}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	92.54%	99.11%	100.00%	None
Max	120.19	208.39	118.25	µg m^{-3}
Min	0.00	0.00	1.09	µg m^{-3}
Median	4.96	3.63	27.68	µg m^{-3}
Monthly mean	9.94	7.20	33.79	µg m^{-3}
PM$_{2.5}$ invalid data status flag				
	Unknown Error Truncation	Deliquescence Truncation	None	

(Min, Max & Median based on 1 minute data)

(ACOEM logo)

422 High Street AQMesh - Data Summary

(Graph shows hourly averaged data)

Note: The following tables exclude data measured during the co-location period.

NO valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	98.99%	80.56%	85.69%	None
Max	432.60	409.70	381.70	µg m^{-3}
Min	0.00	0.00	0.00	µg m^{-3}
Median	29.95	18.40	26.50	µg m^{-3}
Monthly mean	46.88	30.45	38.53	µg m^{-3}
NO invalid data status flag				
	Truncation	Less Than Concentration Limit Truncation	Less Than Concentration Limit Truncation	

(Min, Max & Median based on 15 minute data)

NO$_2$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	89.75%	98.65%	100.00%	None
Max	186.90	208.10	196.90	µg m^{-3}
Min	0.00	0.00	4.20	µg m^{-3}
Median	15.70	29.40	29.15	µg m^{-3}
Monthly mean	27.59	35.77	38.53	µg m^{-3}
NO$_2$ invalid data status flag				
	Truncation	Less Than Concentration Limit Truncation	None	

(Min, Max & Median based on 15 minute data)

PM$_{10}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	74.36%	94.18%	97.92%	None
Max	238.90	129.06	96.91	µg m^{-3}
Min	0.00	0.00	1.72	µg m^{-3}
Median	10.05	11.78	11.80	µg m^{-3}
Monthly mean	20.45	14.59	16.19	µg m^{-3}
PM$_{10}$ invalid data status flag				
	Truncation	Deliquescence Truncation	Deliquescence	

(Min, Max & Median based on 15 minute data)

PM$_{2.5}$ valid data	January Scaled data	February Scaled data	March Scaled data	Unit
Valid data rate	100.00%	95.64%	97.31%	None
Max	97.04	46.47	65.30	µg m^{-3}
Min	1.02	1.71	1.39	µg m^{-3}
Median	8.28	5.57	6.02	µg m^{-3}
Monthly mean	12.22	7.41	9.92	µg m^{-3}
PM$_{2.5}$ invalid data status flag				
	None	Deliquescence	Deliquescence	

(Min, Max & Median based on 15 minute data)

AQMesh Location Changes

Below is a list of all AQMesh devices with the physical location for each device before and after their co-location study. This report includes one contiguous data set for each Cheltenham site location.

Pod Serial Number	Location (Pre Co-location)	Location (Post Co-location)
780150	College Rd	Reference Station - Gloucester Rd
788150	Gloucester Rd School	College Rd
796150	Berkley Place	422 High Street
807150	Winchcombe Street (Fairview)	Berkley Place
845150	Northern End of PE Way	Gloucester Rd / PE Way Roundabout
872150	Gloucester Rd / PE Way Roundabout	Winchcombe Street (Fairview)
1373150	Reference Station - Gloucester Rd	Northern End of PE Way
1931150	Southern End of PE Way	Gloucester Rd School
2102150	422 High Street	Southern End of PE Way

Detailed location change time period is as follows,

Location	Pre Co-location AQMesh	Q1 Running time	Post Co-location AQMesh	Q1 Running time
College Rd	780150	01/01/2021 - 31/03/2021	788150	None
Gloucester Rd School	788150	01/01/2021 - 22/03/2021	1931150	23/03/2021 - 31/03/2021
Berkley Place	796150	01/01/2021 - 14/01/2021	807150	None
Winchcombe Street (Fairview)	807150	01/01/2021 - 22/03/2021	872150	23/03/2021 - 31/03/2021
Northern End of PE Way	845150	01/01/2021 - 04/02/2021	1373150	06/02/2021 - 31/03/2021
Gloucester Rd / PE Way Roundabout	872150	01/01/2021 - 04/03/2021	845150	06/03/2021 - 31/03/2021
Reference Station - Gloucester Rd	1373150	01/01/2021 - 14/01/2021	780150	None
Southern End of PE Way	1931150	01/01/2021 - 04/03/2021	2102150	06/03/2021 - 31/03/2021
422 High Street	2102150	01/01/2021 - 04/02/2021	796150	06/02/2021 - 31/03/2021

ACOEM UK Ground Floor Offices, C1 The Courtyard, Tewkesbury Business Park, Tewkesbury, GL20 8GD
enquire.airmonitors@acoem.com www.acoem.co.uk

Air Monitors is part of the ACOEM Group

39