2019 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the
Environment Act 1995
Local Air Quality Management

June 2019

Malvern Hills District Council

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Report Reference number	MHDC/ASR/2019
Date	June 2019

Executive Summary: Air Quality in Our Area

Air Quality in Malvern Hills District

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

No AQMA's have been declared in the Malvern Hills District.

Monitoring data shows that there is an increase in NO_2 concentrations at all locations when comparing 2018 results with those from 2017. This is likely due to the very low bias adjustment factor in 2017 rather than representing any significant deterioration in air quality across the region. The highest concentration of NO_2 was monitored at location UP1 with a value of 33.71µg/m^3. This is well below the annual mean objective of 40µg/m^3 for nitrogen dioxide. The lowest monitored concentration recorded in the district was 9.99µg/m^3 at urban background location M3N.

Given that all monitored concentrations are well below the annual mean objective for NO_2 it is highly unlikely that there have been any exceedances of the 1-hour mean objective for NO_2 at any monitoring sites.

No changes were made to monitoring locations for the 2018 monitoring year.

Actions to Improve Air Quality

In 2013, WRS produced a countywide Air Quality Action Plan (AQAP) for Worcestershire which was adopted by Malvern Hills District Council (MHDC) on 29th October 2013. WRS have produced two updates to the AQAP, the latest in September 2016. For details of all measures completed, in progress or planned,

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[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

please refer to the 'Air Quality Action Plan Progress Report for Worcestershire April 2015-2016'. A copy of this, the previous update, and the AQAP, is available to view or download at

http://www.worcsregservices.gov.uk/pollution/air-quality/air-quality-action-plan.aspx

In 2014, WRS set up the Worcestershire Air Quality Steering Group and sub-groups to facilitate progressing implementation of prioritised actions identified in the AQAP. To date the Malvern Hills area does not form a specific part of the AQAP as there is no current AQMA in the area. However the general actions to improve air quality detailed in the AQAP apply across Worcestershire as a whole, including the Malvern Hills area.

Conclusions and Priorities

There are currently no AQMAs declared in the Malvern Hills District.

The priorities for Malvern Hills District Council are to continue to monitor nitrogen dioxide at key points across the area.

Local Engagement and How to get Involved

There are a number of ways members of the public can help to improve local air quality:

- Walk or cycle around the District instead of driving;

- Worcestershire County Council have launched a car sharing website, LiftShare, to help people find others journeying to the same destinations to share journeys and costs, and reduce traffic and emissions. Visit this link for more information: https://liftshare.com/uk/community/worcestershire

- General travel planning advice is available on Worcestershire County Council's website (including walking, cycling and bus maps and timetables) and Government website:

  o http://www.worcestershire.gov.uk/info/20007/travel_and_roads

  o https://www.gov.uk/government/publications/smarter-choices-main-report-about-changing-the-way-we-travel

- If you have to drive follow fuel efficient driving advice, often known as 'Smarter Driving Tips', to save on fuel and reduce your emissions. A number of websites promote such advice including:

  o http://www.energysavingtrust.org.uk/transport/driving-advice

  o https://www.theaa.com/driving-advice/fuels-environment/drive-smart

  o https://www.vehicle-certification-agency.gov.uk/fcb/smarter-driving-tips.asp

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1   Local Air Quality Management

This report provides an overview of air quality in Malvern Hills District during 2018. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Malvern Hills District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

There is no history of any AQMA being declared in the Malvern Hills District. Concentrations continue to fall well below the annual mean objective for nitrogen dioxide at measured locations.

For reference, maps of all monitoring locations within the Malvern Hills District area are available in Appendix D.

2.2 Progress and Impact of Measures to address Air Quality in Malvern Hills District

The 2018 ASR report has been submitted but no appraisal has been provided by Defra up to this point.

There have been no exceedances of the annual mean objective for nitrogen dioxide at any monitoring location across the Malvern Hills District in 2018. Concentrations have remained well below the objective.

No specific actions have been progressed to improve air quality in the Malvern Hills District as there is currently no declared AQMA in the area. However the general actions to improve air quality detailed in the AQAP apply across Worcestershire as a whole, including the Malvern Hills area.

Please refer to the Air Quality Action Plan Progress Report for Worcestershire 2015-2016, available at

http://www.worcsregservices.gov.uk/media/2294583/WRS-AQAP-Progress-Report-2015-16.pdf

2.3 PM$_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of PM$_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5μm or less). There is clear evidence that PM$_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

WRS has reviewed the DEFRA national background maps to determine projected PM$_{2.5}$ concentrations within the Malvern Hills District for the 2018 calendar year. The average total PM$_{2.5}$ at 577 locations (centre points of 1km x 1km grids) across the Malvern Hills District is 8.01μg/m^3, with a minimum concentration of 6.93μg/m^3 and a maximum concentration of 10.33μg/m^3. This indicates that PM$_{2.5}$ concentrations within the Malvern Hills District are well below the annual average EU limit value for PM$_{2.5}$ of 25μg/m^3.

As outlined in Policy Guidance LAQM.PG16 WRS have discussed the role of the DoPH and the details of PM$_{2.5}$ levels across the County with the Director of Public Health for Worcestershire County Council. The DoPH has not confirmed to WRS that they are advocating or supporting any specific actions to reduce PM$_{2.5}$ concentrations across the County at this time.

In light of the above no additional actions are currently planned by Malvern Hills District Council in relation to the reduction of PM$_{2.5}$ levels. However it is anticipated that any actions taken to improve NO$_2$ levels across the District will likely result in a linked improvement in PM$_{2.5}$ levels.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

No automatic monitoring has been undertaken in the Malvern Hills district during 2018.

3.1.2 Non-Automatic Monitoring Sites

Malvern Hills District Council undertook non- automatic (passive) monitoring of NO2 at 7 sites during 2018. This was the same as the previous year. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. "annualisation" and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, "annualisation" and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO$_2$)

Table A. in Appendix A compares the ratified and adjusted monitored NO$_2$ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

During 2018 Malvern Hills District Council monitored annual mean nitrogen dioxide concentrations using passive diffusion tubes at seven locations across the district. These remained the same locations as the previous year.

No exceedance of the annual mean objective for NO$_2$ was recorded. The highest concentration of NO$_2$ was measured at location UP1 with a value of 33.71µg/m^3 which is nearly 20% below the objective. The lowest value of 9.99µg/m^3 was recorded at background location M3N.

Although there is a rise in concentrations recorded in 2018 when compared to those of the previous year this is attributable to the very low bias adjustment factor applicable in 2017 rather than representing a significant decline in air quality in 2018. Concentrations remain stable when comparing the results over the last 5 years and continue to be recorded well within the objective.

Table A.2 in Appendix A compares the ratified and adjusted monitored NO2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m3. For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B. Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments are included in Appendix C.

Appendix A: Monitoring Results

Table A.1 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube collocated with a Continuous Analyser?	Height (m)
UP1	2 Old Street,Upton	Roadside	385171	240555	NO2	No	0	2	No	2.10m
UP3	15 Old Street, Upton	Roadside	385157	240508	NO2	No	0	1.25	No	1.98m
M3N	LP 10 Teme Avenue	Urban Background	379790	245677	NO2	No	7	1	No	2.20m
M2	Outside Santler Court, Howsell Rd	Roadside	378320	247570	NO2	No	5	1	NO	2.20m
M5N	Richmond Road - Link Wines	Roadside	378520	247753	NO2	No	0.5	4.5	No	2.30m
M11	Old Post Office, Powick	Roadside	383231	251684	NO2	No	7	2.1	No	2.10m
M14	278 Worcester Road, Malvern	Roadside	379156	248248	NO2	No	0	5.85	No	3.2m

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2) N/A if not applicable.

Table A.2 – Annual Mean NO$_2$ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	NO$_2$ Annual Mean Concentration (µg/m^3) [3]				
					2014	2015	2016	2017	2018
UP1	Roadside	Diffusion Tube	100	100	31.73	32.99	35.90	30.10	33.71
UP3	Roadside	Diffusion Tube	100	100	35.07	32.80	34.80	28.66	32.36
M3N	Urban Background	Diffusion Tube	100	100	12.46	10.34	11.60	8.09	9.99
M2	Roadside	Diffusion Tube	100	94				17.57	24.37
M5N	Roadside	Diffusion Tube	100	100	27.05	25.68	27.50	22.76	26.34
M11	Roadside	Diffusion Tube	100	100	31.76	29.99	33.60	25.95	31.39
M14	Roadside	Diffusion Tube	100	100			23.00	17.67	22.17

☒ **Diffusion tube data has been bias corrected**

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

Exceedances of the NO$_2$ annual mean objective of 40µg/m^3 are shown in **bold**.

NO$_2$ annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO$_2$ 1-hour mean objective are shown in **bold and underlined.**

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.1 – Trends in Annual Mean NO₂ Concentrations
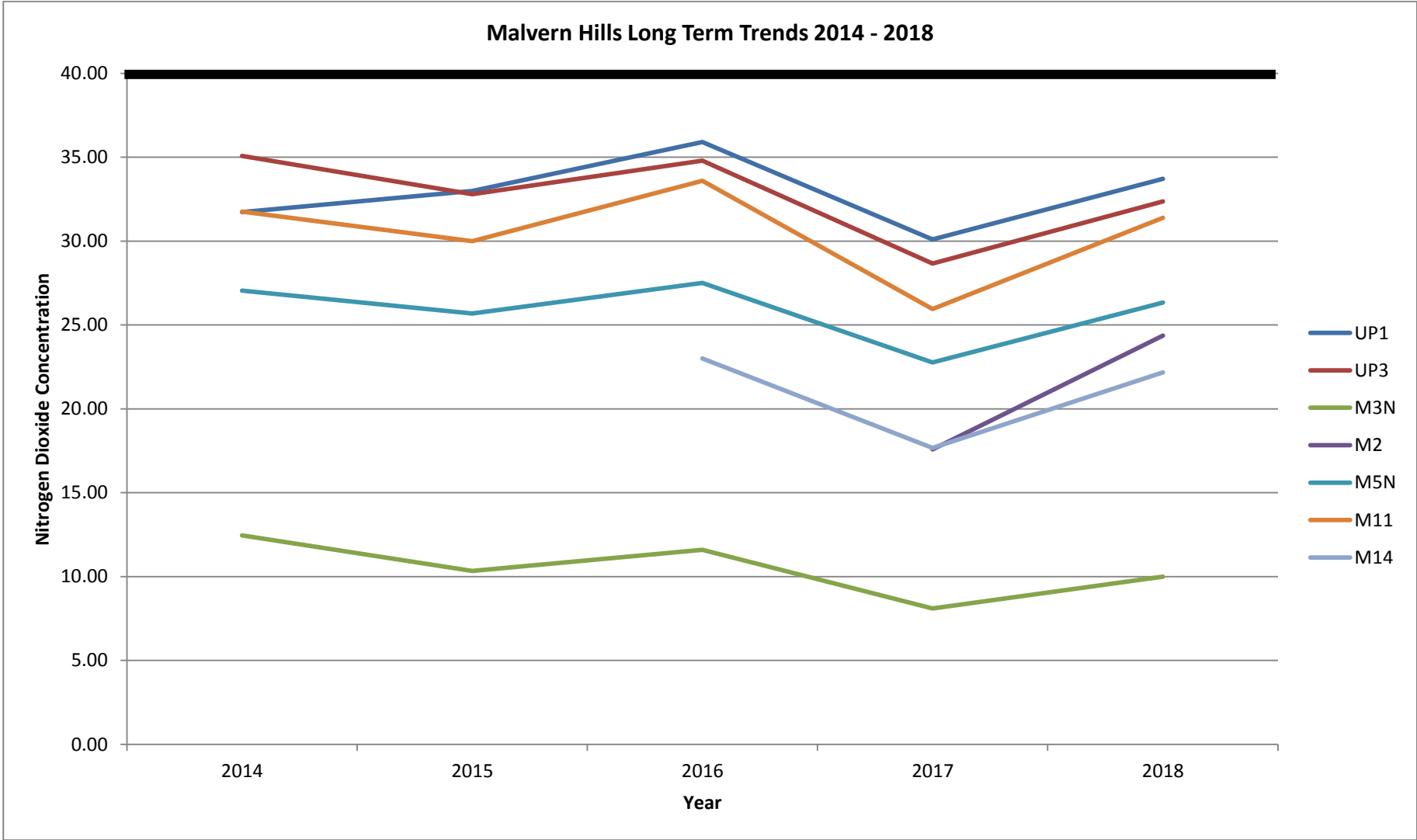
Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO$_2$ Monthly Diffusion Tube Results - 2018

Site ID	NO$_2$ Mean Concentrations (µg/m^3)												Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.89) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
UP1	44.91	38.30	49.07	41.77	38.59	31.01	37.13	33.97	34.27	35.92	34.89	34.79	37.88	33.71	
UP3	40.68	46.85	33.71	37.84	42.59	37.88	36.63	28.55	30.07	35.27	34.99	31.24	36.36	32.4	
M3N	15.03	16.24	14.28	10.10	8.28	9.52	6.99	7.13	7.86	11.82	14.10	13.41	11.23	10.0	
M2	26.65	31.06	30.69	26.66	31.19	29.41	22.39	18.86		27.87	31.37	24.99	27.38	24.4	
M5N	33.36	33.41	36.98	28.83	26.58	25.88	26.88	25.98	27.82	27.43	30.54	31.38	29.59	26.3	
M11	37.74	38.29	41.55	36.41	35.51	30.39	29.51	24.90	31.36	34.96	44.49	38.12	35.27	31.4	
M14	25.47	27.50	31.82	26.77	26.75	24.55	21.28	17.17	18.02	23.93	29.86	25.11	24.85	22.2	

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

☒ **Annualisation has been conducted where data capture is <75%**

☒ **Where applicable, data has been distance corrected for relevant exposure**

Notes:
Exceedances of the NO$_2$ annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **<u>bold and underlined.</u>**

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

QA/QC Data

Factor from Local Co-location Studies (if available)

No local co-location studies for nitrogen dioxide have been undertaken in 2018.

Diffusion Tube Bias Adjustment Factors

The following UKAS accredited company provides Malvern Hills District Council with nitrogen dioxide diffusion tubes and analysis:

Somerset Scientific Services,
Unit 2A,
Westpark 26
Chelston
Wellington
Somerset
TA21 9AD

01823 355906

sssmailbox@somerset.gov.uk

The 20% Triethanolamine (TEA) / De-ionised Water preparation method is used. The bias adjustment factor applied to the results in 2018 was 0.89 (Spreadsheet Version No. 03/19) which were derived from the national studies.

QA/QC of Automatic Monitoring

No Automatic Monitoring Data is available for 2018

QA/QC of Diffusion Tube Monitoring

Under the AIR NO_2 PT (formerly WASP) Scheme Somerset Scientific Services performed 100% satisfactory for the period January to October 2018. Tube precision was 'Good' throughout 2018.

Appendix D: Map(s) of Monitoring Locations and AQMAs

Monitoring locations in Malvern Link

Monitoring Location at Powick

Monitoring Location Malvern Background

Monitoring Locations Upton upon Severn

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

| Pollutant | Air Quality Objective[4] | |
	Concentration	Measured as
Nitrogen Dioxide (NO$_2$)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM$_{10}$)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO$_2$)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

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[4] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
…	…

References

1. DEFRA (2016) 'Local Air Quality Management Policy Guidance LAQM PG.(16)'

2. DEFRA (2016) 'Local Air Quality Management Technical Guidance LAQM TG.(16)'

3. DEFRA (2017) 'National Diffusion Tube Bias Adjustment Factor Spreadsheet v.03/16'

4. Worcestershire Regulatory Services (2013) 'Air Quality Action Plan for Worcestershire'

5. Worcestershire Regulatory Services (2015) 'Air Quality Action Plan Progress Report for Worcestershire April 2013-April 2015'

6. Worcestershire Regulatory Services (2016) 'Air Quality Action Plan Progress Report for Worcestershire April 2015 – March 2016'

7. Worcestershire Regulatory Services (2018) 'Malvern Hills District Council Annual Status Report 2018'