Worcestershire
Regulatory Services
Supporting and protecting you

2016 Air Quality Annual Status Report (ASR)

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

December 2016

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Executive Summary: Air Quality in Our Area

Why air quality matters

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].

Air Quality in Wychavon District

Worcestershire Regulatory Services (WRS) is a shared service formed from the Environmental Health and Licensing departments of the six Worcestershire District Councils. Responsibility for managing (monitoring and reporting of) local air quality transferred from the partnership councils to WRS in April 2011.

Monitoring results within the Wychavon District (WDC) area demonstrate no discernible trend in concentrations across the district in 2015 or over the 5 year period 2011 – 2015.

A single Air Quality Management Area (AQMA) was declared by WDC in 2007 for exceedences of the annual average mean objective for nitrogen dioxide (NO_2). The AQMA is known as Port Street, Evesham AQMA.

[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

Details of declaration and plans of the AQMA can be found on the following pages of WRS website: http://www.worcsregservices.gov.uk/pollution/air-quality/air-quality-management-areas.aspx

Port Street AQMA in 2015

In 2015 there have been no exceedences of the annual average mean objective for NO_2 in the Port Street AQMA. In addition, in 2015 no concentrations of NO_2 were within 5% of the annual average mean objective for NO_2 in the Port Street AQMA.

Concentrations of NO_2 between 2011 and 2015 suggest monitoring and review should continue in 2016. The Port Street AQMA should remain in place at this time.

Following collection of 2016 monitoring data Wychavon District Council will consider undertaking a detailed study of the AQMA in order to determine whether the AQMA can be revoked.

Worcester Road, Wychbold in 2015

Three exceedences of the annual mean objective for NO_2 have been recorded in the Worcester Road, Wychbold area in 2015.

Wychavon District Council has begun a detailed assessment of the area to determine whether declaration of an AQMA is required. At the time of writing of this report seven months of automatic analyser data has been gathered. This, in combination with diffusion tube data and detailed dispersion modelling, will be used to determine whether declaration of an AQMA is required and, if it is, the geographical extent of that AQMA. It is anticipated a detailed assessment of the Worcester Road,

Wychbold area will be completed in 2017. Further update on monitoring and action progress will be provided in 2017 Annual Status Report.

Other areas across the District in 2015

No exceedences of the annual mean objective for NO_2, or any concentrations within 5% of that objective, have been recorded at any other location in the District in 2015.

Actions to Improve Air Quality

In 2013, WRS produced a countywide Air Quality Action Plan (AQAP) for Worcestershire which was adopted by WDC on 15th 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, 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. The Port Street (Steering) Sub-Group covers the Port Street, Evesham AQMA. The sub-group currently comprises representatives of WRS, the Worcestershire County Council Air Quality Liaison Officer, and local County and district Councillors.

Local Priorities and Challenges

In November 2014, Worcestershire County Council produced a technical discussion paper for the Worcestershire Air Quality Steering Group which presented a number

of transport focused options for each location with the intention of improving air quality.

The appraisal presented in the paper confirms that congestion and idling traffic are directly linked to poor air quality in the Port Street AQMA.

In 2016 Worcestershire Council advised that options for revocation of the Port Street AQMA will now be assessed as part of the wider Evesham Town Transport Strategy rather than in isolation. This is a move away from original plans to remodel the Port Street/Bridge Street/Waterside junction however remediation of the Port Street AQMA is a key strategic objective of the Evesham Town Transport Strategy. This represents an opportunity for WRS to facilitate strategic transport changes in Evesham to achieve revocation of the existing AQMA and realise improvements in air quality in general across the town.

In 2016 and 2017 WRS will be actively engaging with the Transport Strategy Steering Group for Evesham in order to promote the air quality agenda and ensure that resolution of the Port Street AQMA remains a key focus in the development of the wider transport strategy. Current indicative timelines see model construction and development completed by Easter 2017 with modelling of agreed scenarios taking place in May-June 2017 and pursuit of bids for investment to support the strategy starting in August 2017.

Further information relating to air quality action planning and progress made for Wychavon and the wider Worcestershire area can be found at

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

In addition to the Evesham Town Transport Strategy, Worcestershire County Council is currently developing the fourth Local Transport Plan for the county which is expected to be ready for consultation in early 2017. WRS will continue to liaise with the County Council in the development of these packages to ensure that remediation

of the AQMAs across Worcestershire remains a strategic transport priority. Over the past five years WRS has experienced closer working ties with the County Council's Strategic Transport Team and it is anticipated that collaboration on their strategic policies and improvement schemes at the early planning stages will ensure that air quality improvements remain a priority across all of Worcestershire infrastructure.

WRS on behalf of Wychavon District Council continue to monitor existing locations in 2016 to assess any improvements or degradation in NO_2 concentrations. The data gathered will assist in further assessment of areas of poor air quality outside the current AQMA's. It is anticipated a detailed assessment of the Worcester Road, Wychbold area will be completed in 2017. Further update on monitoring and action progress will be provided in 2017 Annual Status Report.

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://worcestershire.liftshare.com/
- General travel planning advice is available on Worcestershire County Council's website (including walking, cycling and bus maps and timetables).
- 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:
  - http://www.energysavingtrust.org.uk/travel/driving-advice
  - http://www.theaa.com/driving-advice/fuels-environment/drive-smart
  - http://www.dft.gov.uk/vca/fcb/smarter-driving-tips.asp

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1 Local Air Quality Management

This report provides an overview of air quality in Wychavon District during 2015. 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 Wychavon 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 Table E.1 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 the objectives.

A summary of AQMAs declared by Wychavon District Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at http://www.worcsregservices.gov.uk/pollution/air-quality/air-quality-management-areas.aspx

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
Port Street AQMA	NO_2 annual mean	Evesham	Mixed residential and retail street canyon. Main route into the town centre from the east.	Air Quality Action Plan Progress Report for Worcestershire April 2015-2016 http://www.worcsregservices.gov.uk/environmental-health/pollution/air-quality/air-quality-action-plan.aspx
				On-going work

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

Please refer to the Air Quality Action Plan Progress Report for Worcestershire 2015-2016, available at http://www.worcsregservices.gov.uk/pollution/air-quality/air-quality-action-plan.aspx for details relevant to this section.

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.

There are currently no automatic $PM_{2.5}$ monitoring stations in Worcestershire. The nearest AURN $PM_{2.5}$ monitoring station is the Birmingham Acocks Green site approximately 32 miles to the north east of the Wychavon District.

WRS has reviewed the DEFRA national background maps to determine projected $PM_{2.5}$ concentrations with the Wychavon District for the 2015 calendar year. The average total $PM_{2.5}$ at 657 locations (centre points of 1km x 1km grids) across the Wychavon District is 10.27ug/m3, with a minimum concentration of 9.29ug/m3 and a maximum concentration of 12.42ug/m3.

This indicates that $PM_{2.5}$ concentrations within the Wychavon District are well below the annual average EU limit value for $PM_{2.5}$ of 25ug/m3.

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 Wychavon 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 Wychavon district during 2015.

3.1.2 Non-Automatic Monitoring Sites

Wychavon District Council undertook non- automatic (passive) monitoring of NO_2 at 20 sites during 2015. Table A.1 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) and bias adjustment for the diffusion tubes are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for “annualisation” and bias. Results presented in this section are also calculated back and adjusted to relevant exposure where appropriate. 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 annualised monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

Table A.3 in Appendix A summarises monitoring data at those locations where calculation back to relevant exposure is required. The monitoring data in this table is ratified, annualised and calculated back to relevant exposure and compared to the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix B.

Figure 3.1 – Long Term Trends NO_2 Concentrations 2011 – 2014

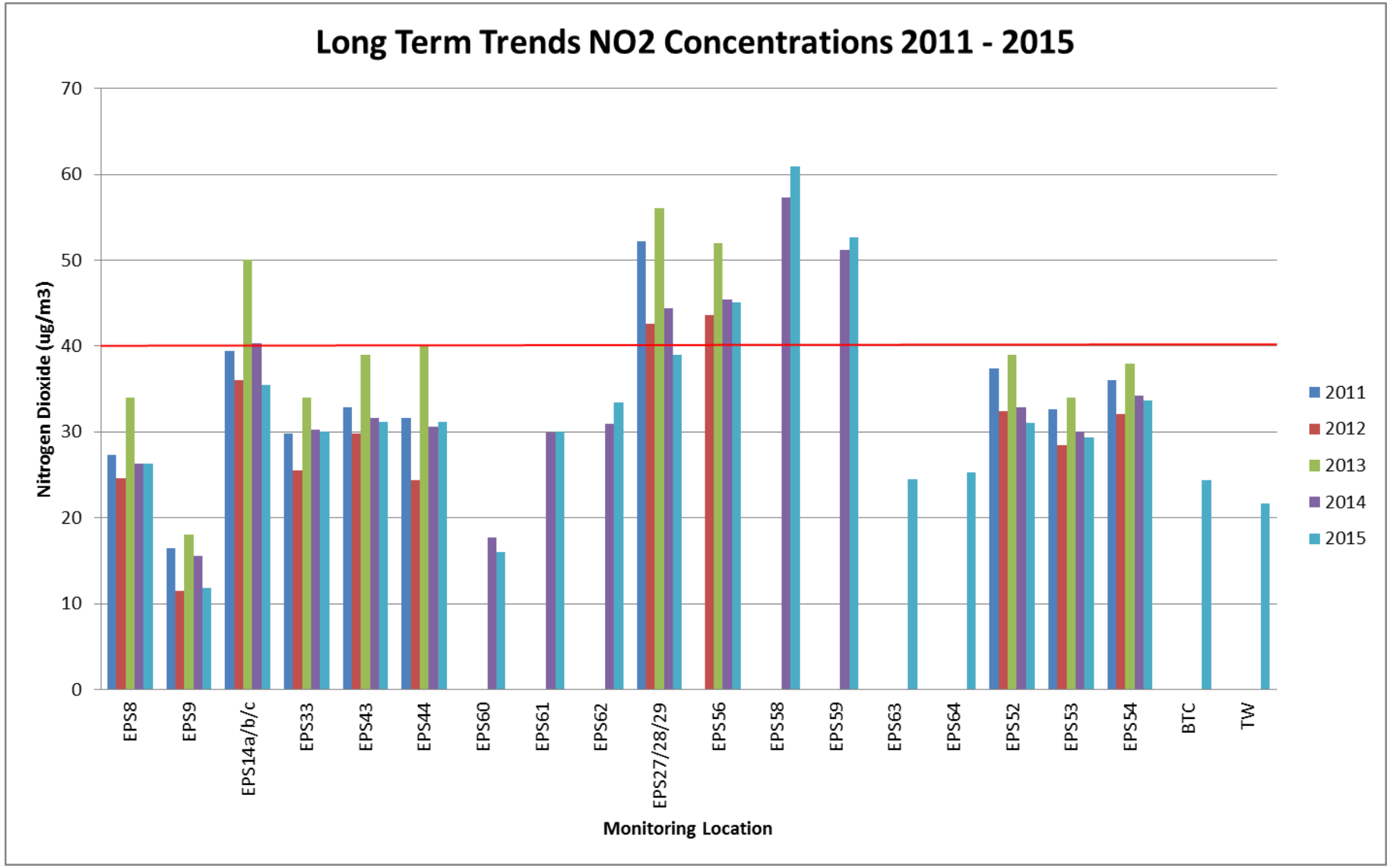


Figure 3.1 above shows the five year trend for NO_2 concentrations, annualised, adjusted for bias and calculated back to relevant exposure where appropriate, at all diffusion tube locations across the Wychavon District. The figure demonstrates that there have been reductions in NO_2 at some locations between 2014 and 2015 but increases in NO_2 levels at other locations. Overall there is no discernible trend in concentrations between 2011 and 2015 across the District.

Table 3.1 below provides a summary of all measured exceedences in 2015 (annualised and calculated back to relevant exposure where necessary).

Table 3.1 Summary of measured exceedences and borderline results in 2015

Site ID	Within AQMA Y/N	Measurement (µg/m^3) (bias-adjusted, annualised and calcualted back to relevant exposure where necessary)
EPS56	N	45.1
EPS58	N	46.0
EPS59	N	40.8

Table 3.1 indicates that there have been exceedences of the annual mean objective (AQO) for NO_2 or concentrations recorded within 5% of the AQO at 3 of the 20 monitoring locations in 2015, when data has been adjusted for bias, annualised and calculated back to relevant exposure.

The three identified exceedences are all located within the vicinity of Worcester Road, Wychbold and are discussed further below.

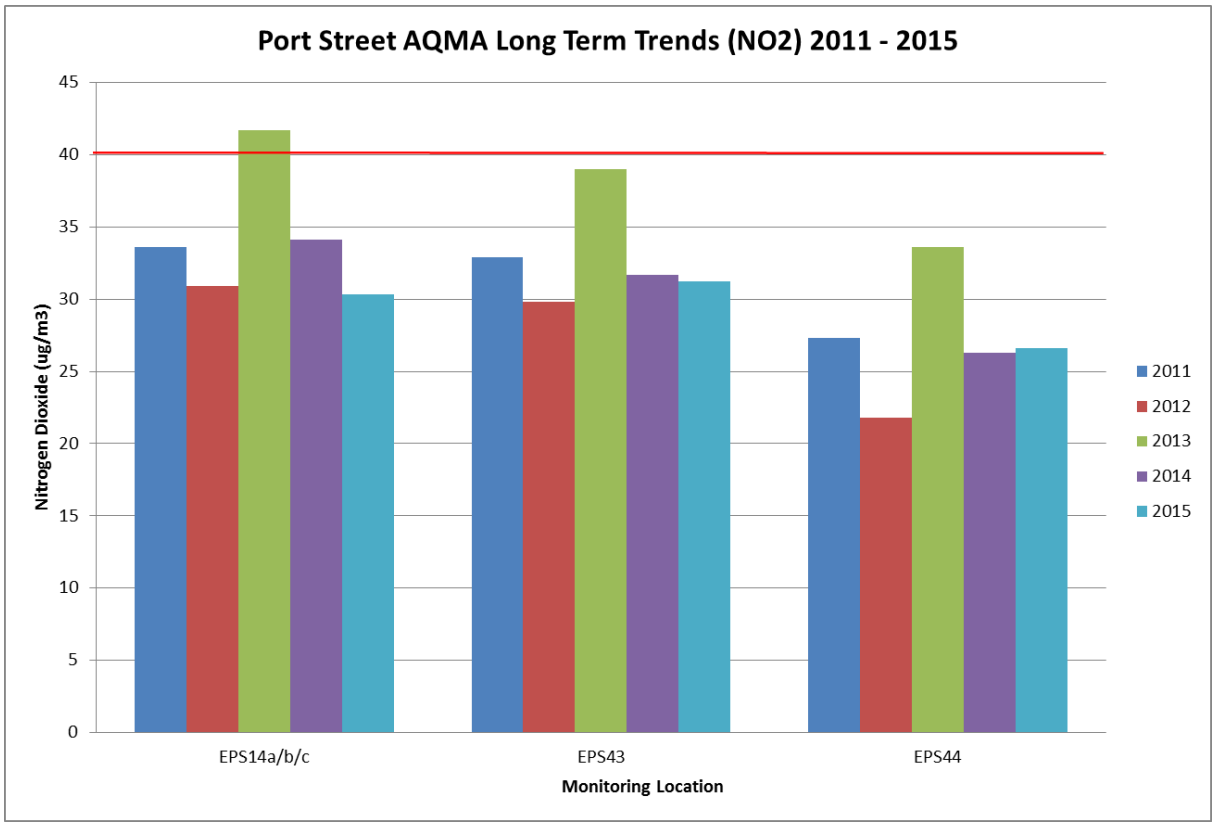
No annual means greater than 60ug/m3 have been recorded indicating that it is unlikely that there have been any exceedences of the 1-hour mean objective for NO_2 at these sites.

Port Street AQMA

No exceedences of the annual mean objective for NO_2 have been recorded in the Port Street AQMA in 2015. In addition no levels within 5% of the annual mean objective have been recorded in 2015.

Figure 3.2 below shows the five year trend for NO_2 concentrations within the Port Street AQMA. The data included in the figure has been adjusted for bias, annualised and calculated back to relevant exposure where necessary.

Figure 3.2 – Port Street Long term Trends 2011 - 2015



Between 2011 and 2015 concentrations of NO_2 have remained below the AQO with the exception of a single exceedence (41.7µg/m3) at location EPS14a/b/c in 2013. In addition concentrations of NO_2 have remained below 5% of the objective with the exception of a single level of 39µg/m3 at location EPS43 also in 2013.

Higher levels of NO_2 were recorded across Worcestershire as a whole in 2013.

The measured results between 2011 and 2015 suggest monitoring and review should continue in 2016. The Port Street AQMA should remain in place at this time.

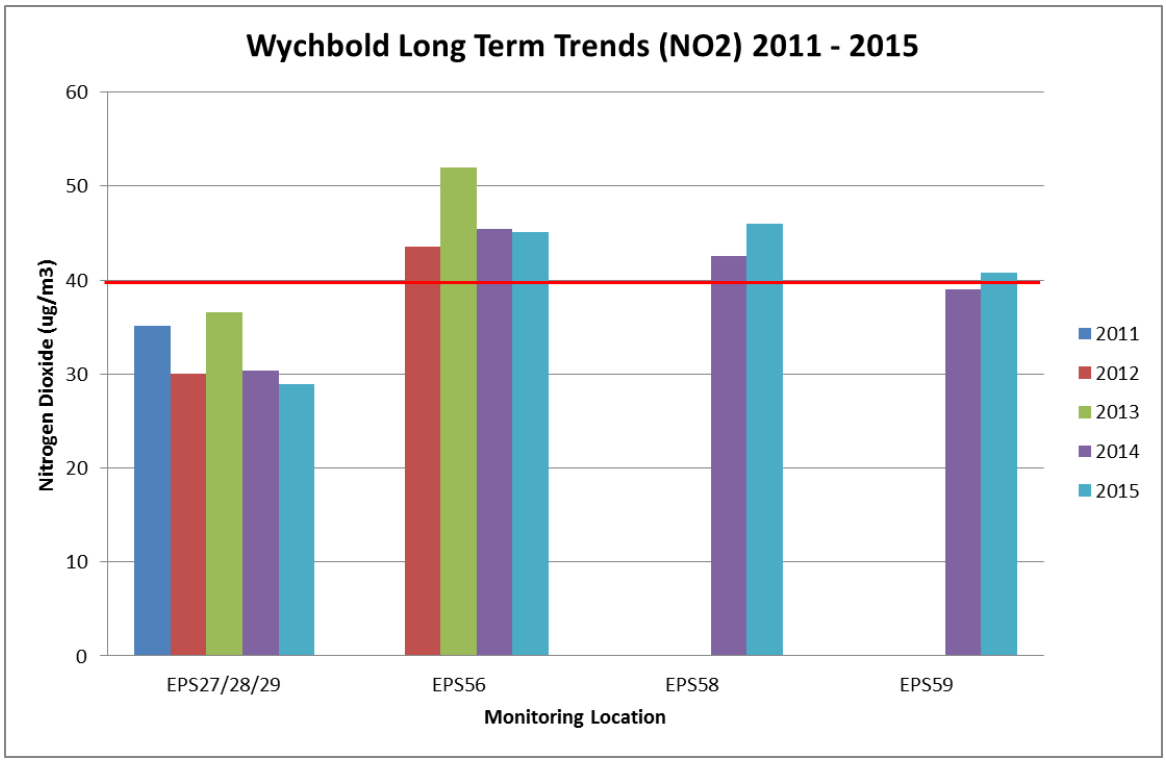
Following validation of 2016 monitoring data Wychavon District Council will consider undertaking a detailed study of the AQMA, in line with paragraphs 3.46 – 3.48 of LAQM Technical Guidance (LAQMTG.16), in order to determine whether the AQMA can be revoked. It is noted that prevailing meteorological conditions will require detailed consideration within any study as the UK has experienced warmer than usual winters over the past three years.

Worcester Road, Wychbold

Three exceedences of the annual mean objective for NO_2 have been recorded in the Worcester Road, Wychbold area in 2015.

Figure 3.2 below shows the five year trend for NO_2 concentrations within the Worcester Road, Wychbold area. The data included in the figure has been adjusted for bias, annualised and calculated back to relevant exposure where necessary.

Figure 3.3 – Wychbold Long Term Trends 2011 – 2015



In 2014 the diffusion tube monitoring network in the Worcester Road, Wychbold area was extended to provide further data to inform assessment going forward to determine whether the area should be declared as an AQMA.

Based on the monitoring data gathered to date Wychavon District Council has begun a detailed assessment of the area to determine whether declaration of an AQMA is required. A chemiluminescent automatic monitor is due to be installed in the area at the end of March 2016. The automatic monitor will operate for a minimum of six months (at the time of writing of this report the automatic monitor has been installed and seven months of continuous monitoring data gathered). The data gathered from this automatic monitoring exercise will be used, in conjunction with diffusion tube data, to inform a detailed assessment of NO_2 levels in the area. Detailed dispersion modelling, using ADMS-Roads, will be undertaken to determine the geographical extent of any required AQMA. The outcome of this detailed assessment will be reported in the 2017 along with a decision as to whether an AQMA should be declared, and if so the geographical extent of any AQMA.

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)
PERSHORE										
EPS8	40 High Street Street Light 8, Pershore	Roadside	395048	245527	NO_2	N	2.0	0.5	N	2.27
EPS9	St. Andrews Road Street light 139, Pershore	Urban Background	394571	245377	NO_2	N	6.0	2.98	N	2.26
EVESHAM										
EPS14a /b/c	Port Street Road Sign	Kerbside	404128	243630	NO_2	Y	1.7	0.73	N	2.35
EPS33	High Street Street light LP 32, Evesham	Roadside	403753	244068	NO_2	N	2.5	3.5	N	2.3
EPS43	Long Stay opp cinema, Port Street	Roadside	404222	243598	NO_2	Y	0	1.85	N	2.35

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)
EPS44	Camera Post opp 33 Port Street	Roadside	404183	243611	NO_2	Y	2.6	1.18	N	2.45
EPS60	Corner of Rynal Street & De La Bere Close SL2, Evesham	Roadside	403914	244046	NO_2	N	5.5	1.1	N	2.13
EPS61	1-6 The Old Dairy, Swan Lane, Evesham	Roadside	403796	244006	NO_2	N	0	1.9	N	2.0
EPS62	Bengal Dreams No 53 Façade, Evesham	Roadside	403729	243971	NO_2	N	0	5.38	N	2.18
WYCHBOLD										
EPS27/ 28/29	Worcester Rd, Wychbold	Roadside	392031	265624	NO_2	N	15.5	2.29	N	2.16
EPS56	Post Office, Worcester Rd, Wychbold	Roadside (façade)	391983	265688	NO_2	N	0	8.05	N	2.06

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)
EPS58	2 Rose Villas, Worcester Road, Wychbold	Roadside	392034	265762	NO_2	N	6.42	1.73	N	2.11
EPS59	Weathervale, Worcester Rd, Wychbold	Roadside	392061	265807	NO_2	N	7.5	2.37	N	2.12
DROITWICH										
EPS63	60 Mayflower Road, Droitwich	Roadside (façade)	390708	262863	NO_2	N	0	2.46	N	1.93
EPS64	Tagwell Close, Droitwich	Roadside	390853	261883	NO_2	N	15.0	37.0	N	2.39
WHITTINGTON										
EPS52	The Bungalow, Whittington	Roadside (façade)	387598	252511	NO_2	N	0	12.0	N	1.99
EPS53	Hillview Cottage, Whittington	Roadside (façade)	387595	252533	NO_2	N	0	22.0	N	1.68
EPS54	Green Rise, Whittington	Roadside (façade)	387591	252541	NO_2	N	0	24.0	N	1.85

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)
BTC	Bannut Tree Cottage, off Swinesherd Way, Whittington	Suburban	388372	254082	NO_2	N	0	18.0	N	1.75
TW	Walkers Lane, Lampost No. 12527, Droitwich	Roadside	387370	253376	NO_2	N	?	1.5	N	1.9

(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 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
PERSHORE									
EPS8	Roadside	Diffusion Tube	92	92	27.3	24.6	34	26.3	26.3
EPS9	Urban Background	Diffusion Tube	92	92	16.5	11.5	18	15.6	11.9
EVESHAM									
EPS14a/b/c	Kerbside	Diffusion Tube	100	100	39.4	36	**49.0**	**40.4**	35.5
EPS33	Roadside	Diffusion Tube	100	100	29.8	25.5	34	30.3	30
EPS43	Roadside	Diffusion Tube	75	75	32.9	29.8	39	31.7	31.2
EPS44	Roadside	Diffusion Tube	100	100	31.6	24.4	**40**	30.6	31.1
EPS60	Roadside	Diffusion Tube	100	100	-	-	-	17.7	15.9
EPS61	Roadside	Diffusion Tube	100	100	-	-	-	29.9	30
EPS62	Roadside	Diffusion Tube	100	100	-	-	-	30.9	33.5
WYCHBOLD									
EPS27/28/29	Roadside	Diffusion Tube	83	83	**52.2**	**42.6**	**55**	**44.4**	39
EPS56	Roadside	Diffusion	100	100	-	**43.6**	**52**	**45.4**	**45.1**

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
	(façade)	Tube							
EPS58	Roadside	Diffusion Tube	100	100	-	-	-	**57.2**	**60.9**
EPS59	Roadside	Diffusion Tube	92	92	-	-	-	**51.2**	**52.67**
DROITWICH									
EPS63	Roadside (façade)	Diffusion Tube	83	83	-	-	-	-	24.5
EPS64	Roadside	Diffusion Tube	92	92	-	-	-	-	25.3
WHITTINGTON									
EPS52	Roadside (façade)	Diffusion Tube	100	100	37.4	32.4	39	32.8	31.1
EPS53	Roadside (façade)	Diffusion Tube	92	92	32.6	28.5	34	30	29.4
EPS54	Roadside (façade)	Diffusion Tube	100	100	36	32.1	38	34.2	33.6
BTC	Suburban	Diffusion Tube	67	67	-	-	-	-	24.4
TW	Roadside	Diffusion Tube	67	67	-	-	-	-	21.7

Notes: Exceedances of the NO_2 annual mean objective of $40\mu g/m^3$ are shown in **bold**.

NO_2 annual means exceeding $60\mu g/m^3$, 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 Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.3 – Annual Mean NO_2 Monitoring Results – calculated back to relevant exposure

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
PERSHORE									
EPS8	Roadside	Diffusion Tube	92	92	22.6	20.6	27.4	21.8	21.7
EPS9	Urban Background	Diffusion Tube	92	92	15.2	11.3	16.2	14.3	11.5
EVESHAM									
EPS14a/b/c	Kerbside	Diffusion Tube	100	100	33.6	30.9	**41.7**	34.1	30.3
EPS33	Roadside	Diffusion Tube	100	100	27.5	23.8	31.1	27.8	27.5
EPS44	Roadside	Diffusion Tube	100	100	27.3	21.8	33.6	26.3	26.6
EPS60	Roadside	Diffusion Tube	100	100	-	-	-	16	14.8
WYCHBOLD									
EPS27/28/29	Roadside	Diffusion Tube	83	83	35.1	30	36.6	30.4	28.9
EPS58	Roadside	Diffusion Tube	100	100	-	-	-	**42.5**	**46**
EPS59	Roadside	Diffusion Tube	92	92	-	-	-	39	**40.8**
DROITWICH									
EPS64	Roadside	Diffusion Tube	92	92	-	-	-	-	23.4
WHITTINGTON									
TW	Roadside	Diffusion Tube	67	67	-	-	-	-	21.4

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 Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2015

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
PERSHORE														
EPS8	39.83		38.17	29.53	24.08	22.72	26.5	28.87	30.24	36.29	32.14	24.6	27.75	26.33
EPS9	20.67		18.05	12.66	7.55	7.64	11.02	12.61	13.99	19.47	13.89	12.41	12.50	11.86
EVESHAM														
EPS14a/b/c	51.9	54.87	44.5	41.86	43.98	38.79	49.33	47.34	42.07	46.83	48.18	45.38	46.25	35.49
EPS33	34.31	40.42	37.51	38.12	26.19	26.71	28.82	32.16	35.69	44.95	32.77	36.69	34.53	30.04
EPS43	42.50	43.00	38.90	34.17	26.13	29.25	33.21	36.97	38.89				26.92	31.22
EPS44	31.77	39.84	39.16	38.18	32.01	31.48	34.87	36.85	36.72	45.54	32.25	30.56	35.77	31.12
EPS60	26.13	24.28	21.41	13.77	12.68	11.58	15.41	17.53	17.93	22.85	18.38	18.34	18.36	15.97
EPS61	36.91	41.80	32.50	28.46	30.87	29.25	33.56	39.16	34.28	32.74	38.59	35.82	34.49	30.01
EPS62	45.03	45.76	38.76	28.52	34.91	33.29	41.04	37.94	38.42	38.67	41.83	37.43	38.47	33.47
WYCHBOLD														
EPS27/28/29	58.59	64.14	60.26	48.99	47.54	48.75	48.19	47.47	44.23	50.64	56.93	56.48	52.68	39.01
EPS56	56.9	64.36	60.25	46.85	46.05	48.38	53.19	52.03	46.74	52.79	48.29	46.47	51.86	45.12
EPS58	74.76	90.13	78.24	61.89	61.88	65.4	64.79	72.06	66.97	76.79	65.22	62.17	70.03	60.92
EPS59	72.51	75.73	63.35	56.17	49.92		54.55	60.22	51.84	64.49	57.54	59.64	55.50	52.67
DROITWICH														
EPS63	26.01	32.68	29.41	31.22		18.76	22.95		29.67	36.15	25.56	29.62	23.50	24.54
EPS64	25.89	36.83	35.12	31.28	21.05	21.88	21.95	27.9	29.54	42.78	25.52		26.65	25.29

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
WHITTINGTON														
EPS52	44.53	49.92	41.69	31.91	35.1	32.94	36.83	33.46	22.34	29.59	37.28	33.4	35.75	31.1
EPS53	41.86	41.99	39.58		28.72	28.62	29.17	28.72	31.3	39.39	30.81	30.97	30.93	29.35
EPS54	49.98	47.73	47.34	35.4	32.35	30.23	35.7	35.89	30.82	46.43	36.2	35.73	38.65	33.63
BTC	21.47	29.7	32.14	25.5			20.65		50.83		27.25	34.88	20.20	24.4
TW		29.17	28.39	20.18	16.47	20.76			39.01	31.28	32.16		18.12	21.7

(1) See Appendix C for details on bias adjustment

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

Sources of pollution

Wychavon District Council has not identified any new or significant changes to sources as described in Chapter 7, section 1 of Technical Guidance LAQM.TG(16)

Diffusion Tube Bias Adjustment Factors

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

Somerset Scientific Services

The Crescent

County Hall

Taunton

TA1 4DY

Tel: 0300 123 2224

Email: somersetscientific@somerset.gov.uk

The 20% Triethanolamine (TEA) / Deionised Water preparation method is used.

The bias adjustment factor applied to the results in 2015 was 0.87 (Spreadsheet Version No: 03/16) which was derived from the national studies.

QA/QC of Diffusion Tube Monitoring

Under the WASP scheme Somerset Scientific Services performed 100% satisfactory for all periods in 2015 to November 2015. Tube precision was “Good” throughout 2015.

Short-term to Long-term Data Adjustment

Annualisation calculation for tube locations BTC and TW are shown below in Table C.1 and C.2

Table C.1 Annualisation calculation BTC – Bannut Tree Cottage, Whittington

Site	Site Type	Annual Mean	Period Mean	Ratio
Birmingham Acocks Green	Urban Background	19	20.6	0.92
Birmingham Tyburn	Urban Background	30	31.5	0.95
Leominster	Suburban Background	8	8.9	0.9
Leamington Spa Rugby Road	Urban Traffic	20	21.6	0.92
			Adjustment factor	0.92
			BTC result	26.36
			BTC result annualised	24.4

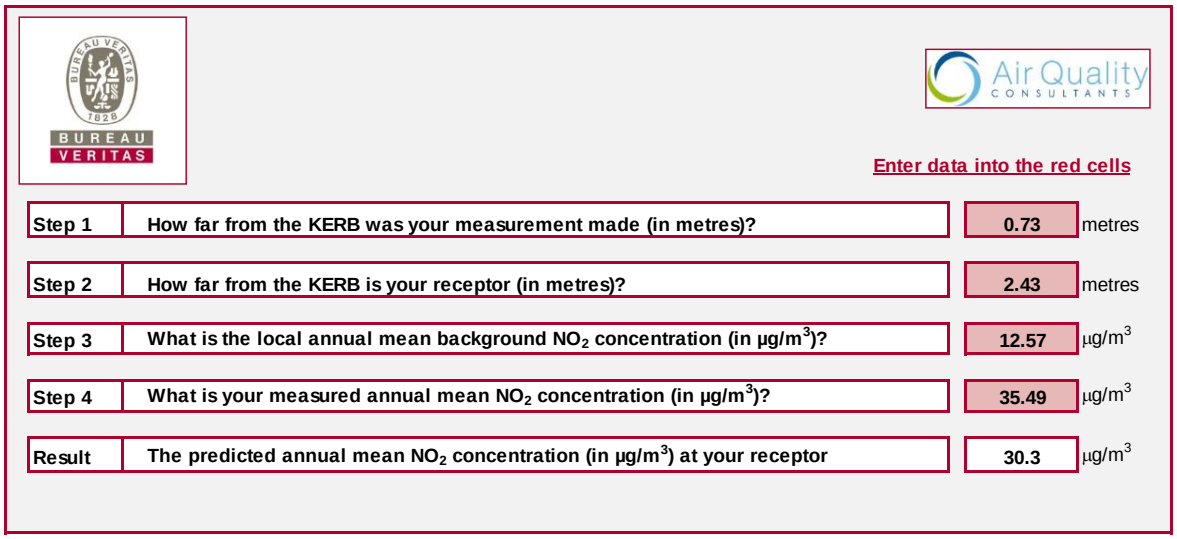
Table C.2 Annualisation calculation TW – Walkers Lane, Whittington

Site	Site Type	Annual Mean	Period Mean	Ratio
Birmingham Acocks Green	Urban Background	19	0.92	0.92
Birmingham Tyburn	Urban Background	30	0.97	0.95
Leominster	Suburban Background	8	0.86	0.9
Leamington Spa Rugby Road	Urban Traffic	20	0.92	0.92
			Adjustment factor	0.92
			TW result	23.64
			TW result annualised	21.7

Estimates of concentrations at nearest receptor

If an exceedence (or result close to an exceedence) is measured at a monitoring site which is not representative of public exposure, the procedure specified in Technical Guidance LAQM.TG(16) has been used to estimate the concentration at the nearest receptor where applicable. The results are presented in Figures C.1 – C.4 below:

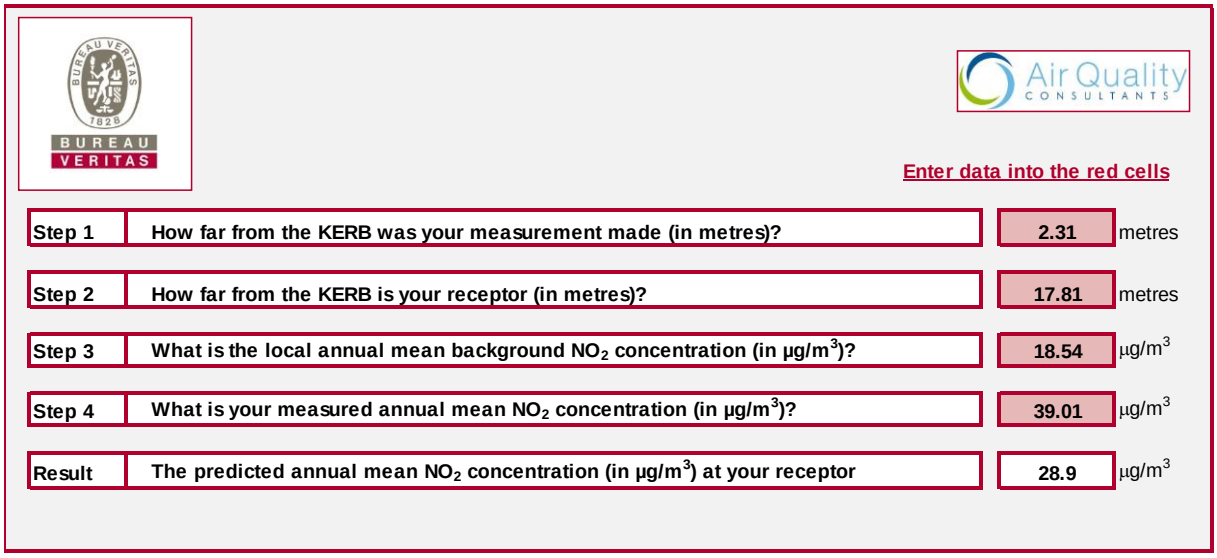
Figure C.1 – EPS14a/b/c, Port Street, Evesham



Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	0.73	metres
Step 2	How far from the KERB is your receptor (in metres)?	2.43	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	12.57	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	35.49	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	30.3	µg/m^3

Figure C.2 – EPS27/28/29, Worcester Road, Wychbold



Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	2.31	metres
Step 2	How far from the KERB is your receptor (in metres)?	17.81	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	18.54	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	39.01	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	28.9	µg/m^3

Figure C.3 – EPS58, 2 Rose Villas, Worcester Road, Wychbold

Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	1.73	metres
Step 2	How far from the KERB is your receptor (in metres)?	8.15	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	18.54	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	60.92	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	46.0	µg/m^3

Figure C.4 – EPS59 Weathervale, Worcester Road, Wychbold

Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	2.37	metres
Step 2	How far from the KERB is your receptor (in metres)?	9.87	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	18.54	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	52.67	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	40.8	µg/m^3

Appendix D: Map(s) of Monitoring Locations

Figure D.1 Pershore Monitoring Locations

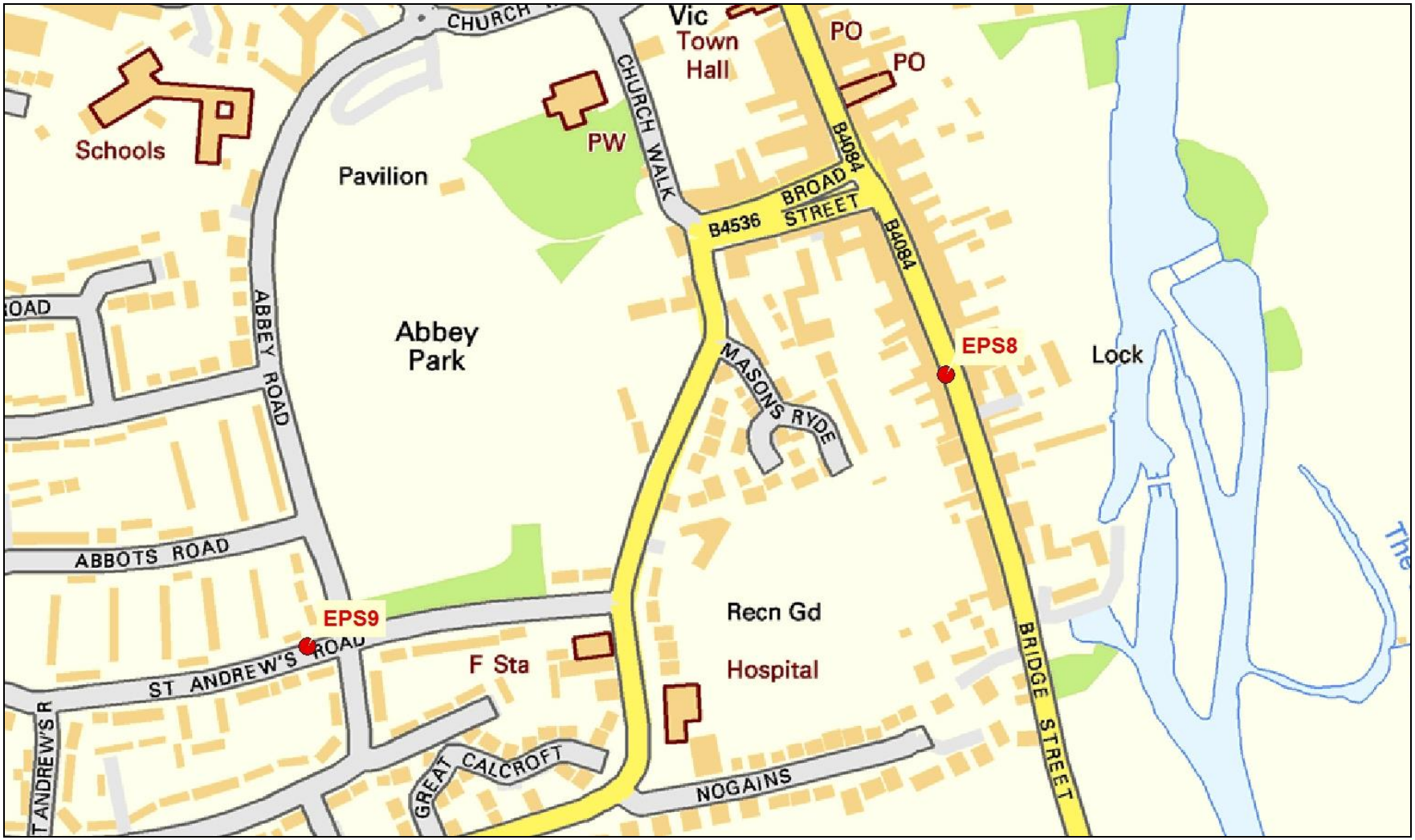


Figure D.2: Evesham Monitoring Locations

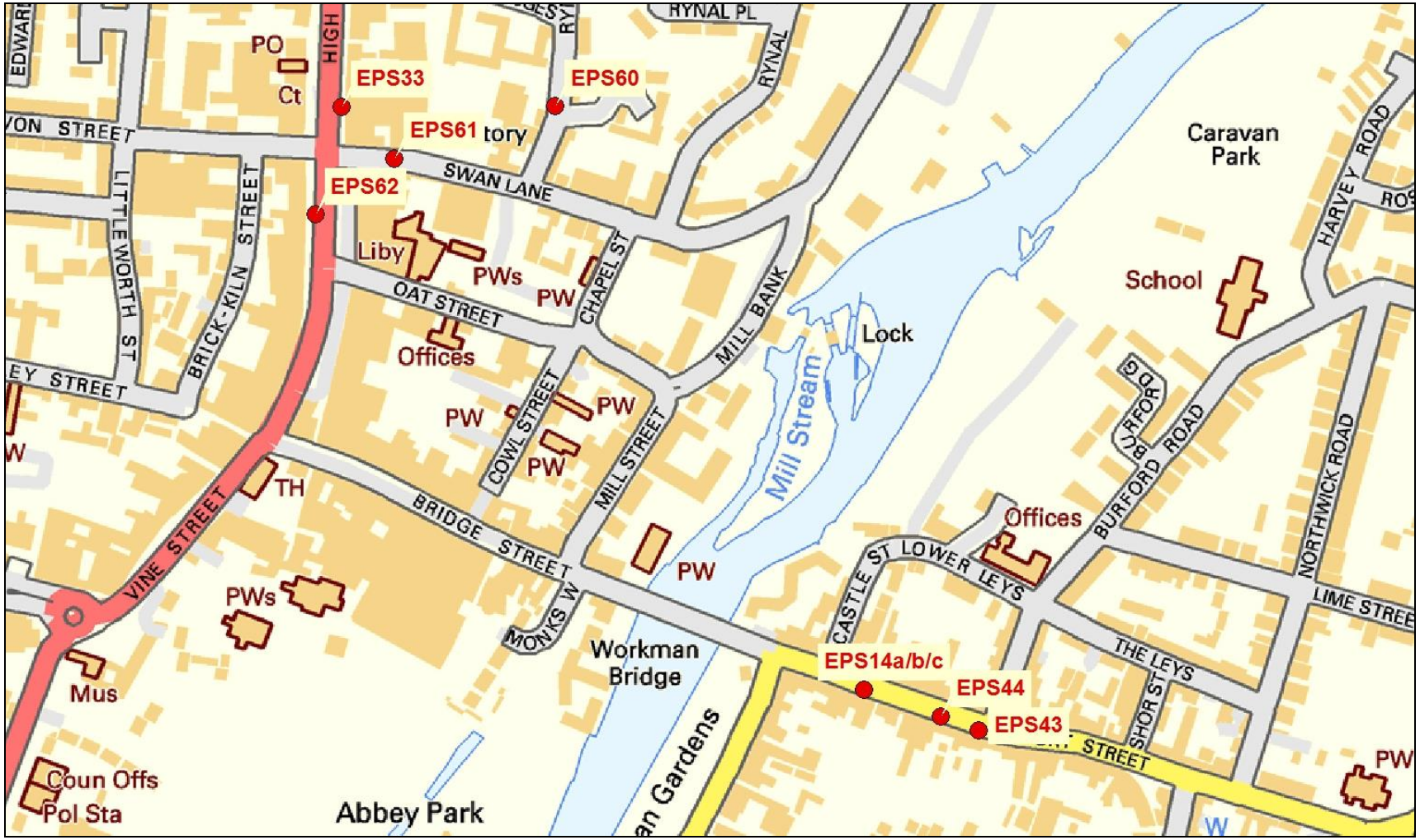


Figure D.3: Wychbold Monitoring Locations

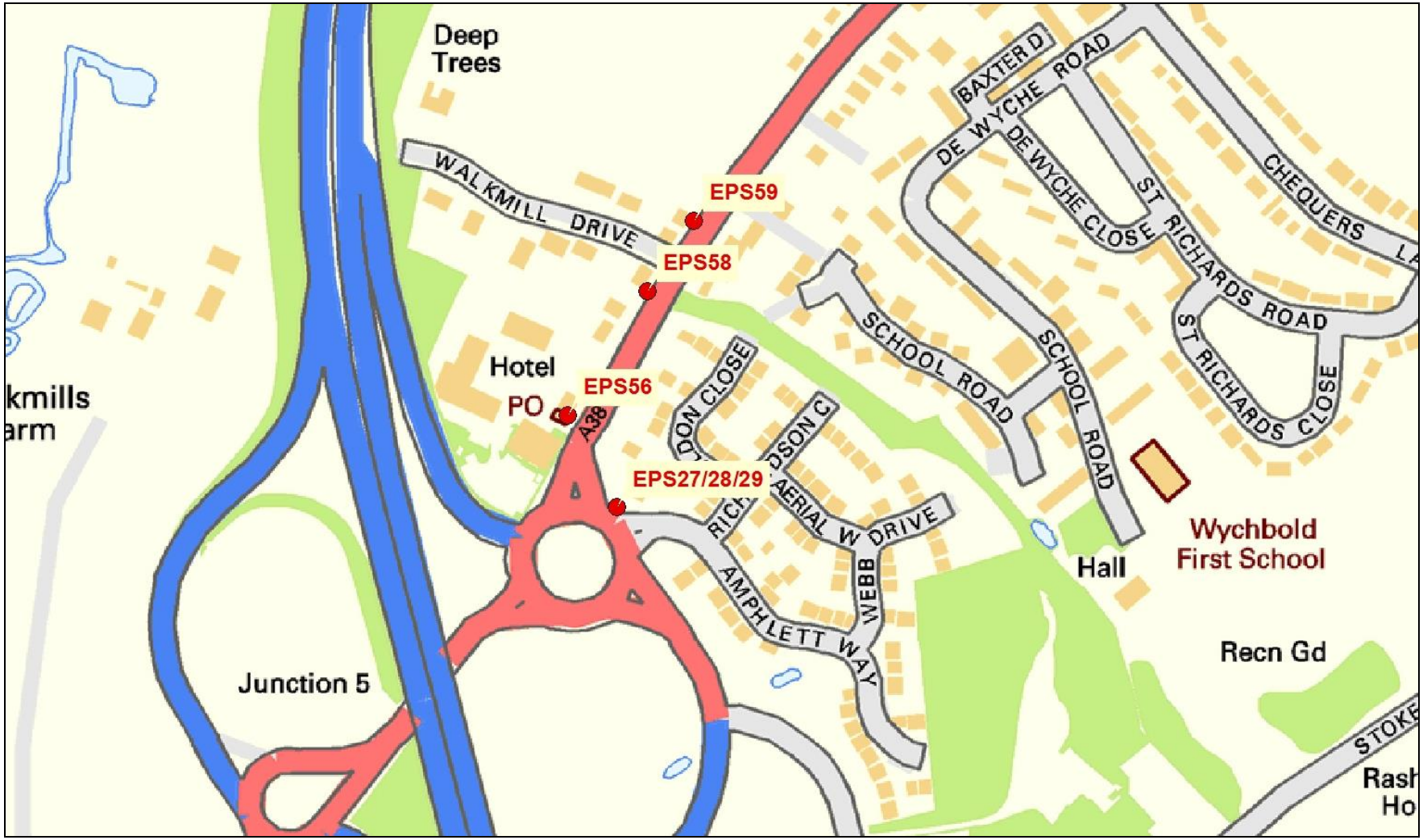
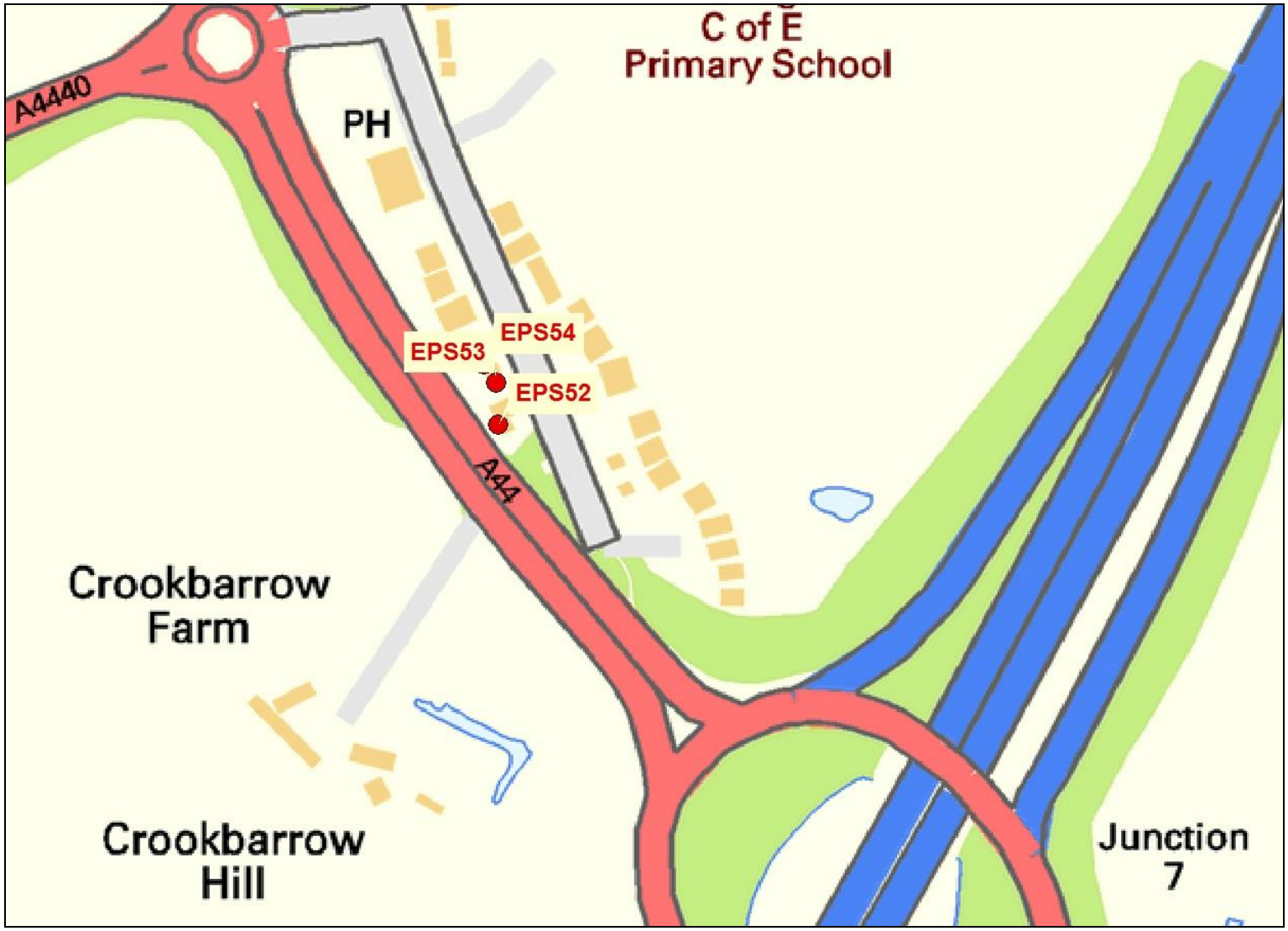


Figure D.4: Droitwich Monitoring Locations

Figures D.5, D.6 and D.7 Whittington Monitoring Locations




Wks
A441
BAYNHAM DRIVE
Government Offices
KILBURY DRIVE
SWINESHERD WAY
STUART RI
WHITTINGTON ROAD
Red Hill
WHITEWOOD WAY
Coll
TW
A449
The Elms
Recn Gd
A4440
WALKERS LANE
The Chapelry
A4440
CHURCH LANE
Whittington Hall
PW


NUNNERY WAY
The Tack
Hornhill Meadows
(Nature Reserve)
Countryside
Centre
Car Park
A4440
Cudleigh Court
Cottage
WILDWOOD DRIVE
A44
Coun
Offs
Swinesherd
BTC
Swinesherd Copse
The Hill
House
Park
Farm

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

[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 (2016) ‘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’