Air Quality Updating and Screening Assessment 2006

SYSTEM CERTIFICATION ISO 9001:2000 SGS

SYSTEM CERTIFICATION ISO 14001:2004 SGS

Beacon Council 2005-2006 Effective Environmental Health

Coventry City Council

Air Quality Updating and Screening Assessment 2006

Executive Summary

Under Part IV of the Environment Act 1995 all local authorities are required to review and assess air quality against objectives specified for certain pollutants which are detrimental to human health. The review and assessment process is carried in accordance to a timetable stipulated by the National Air Quality Strategy. In 2006 all Local Authorities are required to produce an Updating and Screening Assessment (USA).

The aim of the USA is to identify areas where air quality has changed since the previous round of review and assessment and has increased the risk of exceedence of any UK air quality objective. Review and Assessment is carried out according to Department for Environment Food and Rural Affairs Technical Guidance Note LAQM.TG(03). If on the basis of its assessment, the local authority finds that an air quality objective is unlikely to be met in any part of its district, the area of exceedence must proceed to Detailed Assessment. Should this demonstrate that a UK air quality objective is exceeded, the Local Authority must declare an Air Quality Management Area (AQMA) and produce an Action Plan detailing how it intends to meet the objectives.

Previous rounds of air quality review and assessment in Coventry have led to the declaration of three AQMA's in Coventry due to the failure to meet the UK objective for the annual mean concentration of nitrogen dioxide. Nitrogen dioxide levels are regulated because there is evidence that at high levels it can inflame the airways to the lungs and over a long time affect how well the lungs work. People with asthma are particularly affected. The greatest source of nitrogen oxides is road transport.

Coventry's current Air Quality Management Areas are:

> AQMA 1: the City Centre and is composed of an area in the region of Cross Cheaping, the Burges, Hales Street, Trinity Street, and Ironmonger Row.

AQMA 2: an area around the A4600 Walsgrave Road between Brighton Street and Shakespeare Street in the Ball Hill area of Coventry.

AQMA 3: an area surrounding the junction of Allesley Old Road B4106, Four Pounds Avenue and Queensland Avenue.

For the majority of pollutants levels in Coventry still remain below the UK objectives. The exception to this is nitrogen dioxide where more areas have been found to exceed the UK objective annual mean for 2005 and will need to proceed to Detailed Assessment. These areas are:

Foleshill Road
London Road / Tollbar Island
Radford Road / Beake Avenue junction (if residential property is introduced)
Spon End / Hearsall Lane
Stoney Stanton Road
Croft Road, City Centre

Given the number of areas to proceed to Detailed Assessment it is highly likely that Coventry will have to declare further Air Quality Management Area's.

There is research demonstrating that nitrogen dioxide emissions at busy roadsides have increased due to increasing emissions from diesel vehicles and particularly some designs of particle traps on buses. Furthermore, in Coventry, building residential properties at roadsides where nitrogen dioxide levels are above the objective as they have led to public exposure.

Coventry City Council has proposed a substantial increase in the population of Coventry within the next 10 to 15 years. To decrease the level of air pollution in the City in these conditions will require an innovative transport plan, which limits transport fuelled by fossil fuels to a sustainable level.

Updating and Screening Assessment

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Contents

1 Introduction

The Environment Act 1995 introduced the concept of Local Air Quality Management (LAQM), requiring Local Authorities to review air quality in their areas on a periodic basis to ensure that objectives for seven key pollutants named in the UK Governments Air Quality Strategy are met. The objectives for these pollutants are set to protect human health and are assessed in areas where people are regularly present and may be affected by air pollution. The pollutants named in the Air Quality Strategy are:

Benzene
1,3-Butadiene
Carbon Monoxide
Lead
Nitrogen Dioxide
Particles (PM_{10})
Sulphur Dioxide
Ozone.

Local Authorities are not required to meet ozone objectives, as ozone is a long-range pollutant, which is seen as a national rather than a local authority problem.

Local Authorities are required to produce an Updating and Screening Assessment (USA) of their areas every three years. If the USA identifies a place where objectives are not likely to be met by a target date, they must carry out a detailed assessment of that location and declare an Air Quality Management Area (AQMA). They must then perform a Stage 4:Further Assessment of the AQMA within 12 months of the Declaration and produce an Action Plan to try to reduce pollution in that location within 12 to 18 months of the Declaration. In addition to this Local Authorities must produce progress reports in years when USA's or Detailed Assessments are not produced.

1.A Previous Review and Assessment in Coventry

Coventry and the other six West Midlands Authorities began the Review and Assessment process in 1998.

Following the USA completed in 2003, two locations in Coventry were assessed to be unlikely to meet the annual mean objective for nitrogen dioxide by the target date of 2005. These were the Ball Hill area of Walsgrave Road and an area of the city centre including Trinity Street and the Burges. They were both designated as AQMA's in August 2003.

A Detailed Assessment, completed in 2004, demonstrated that the junction of Queensland Avenue and Allesley Old Road was also unlikely to meet the 2005 annual mean objective for nitrogen dioxide by 2005 and was declared an AQMA in August 2004.

This document comprises the Updating and Screening Assessment for 2006 for Coventry.

1.B Purpose of the Review and Screening Assessment

The aim of the Updating and Screening Assessment is to identify areas where air quality has changed since the previous round of review and assessment and has led to a risk of exceedence of a UK air quality objective. Review and Assessment is carried out according to DEFRA Technical Guidance Note LAQM.TG(03), updated January 2006. Those areas identified as potentially exceeding a UK air quality objective will proceed to detailed assessment. Sites of air quality monitoring in Coventry are shown in Figure 1.

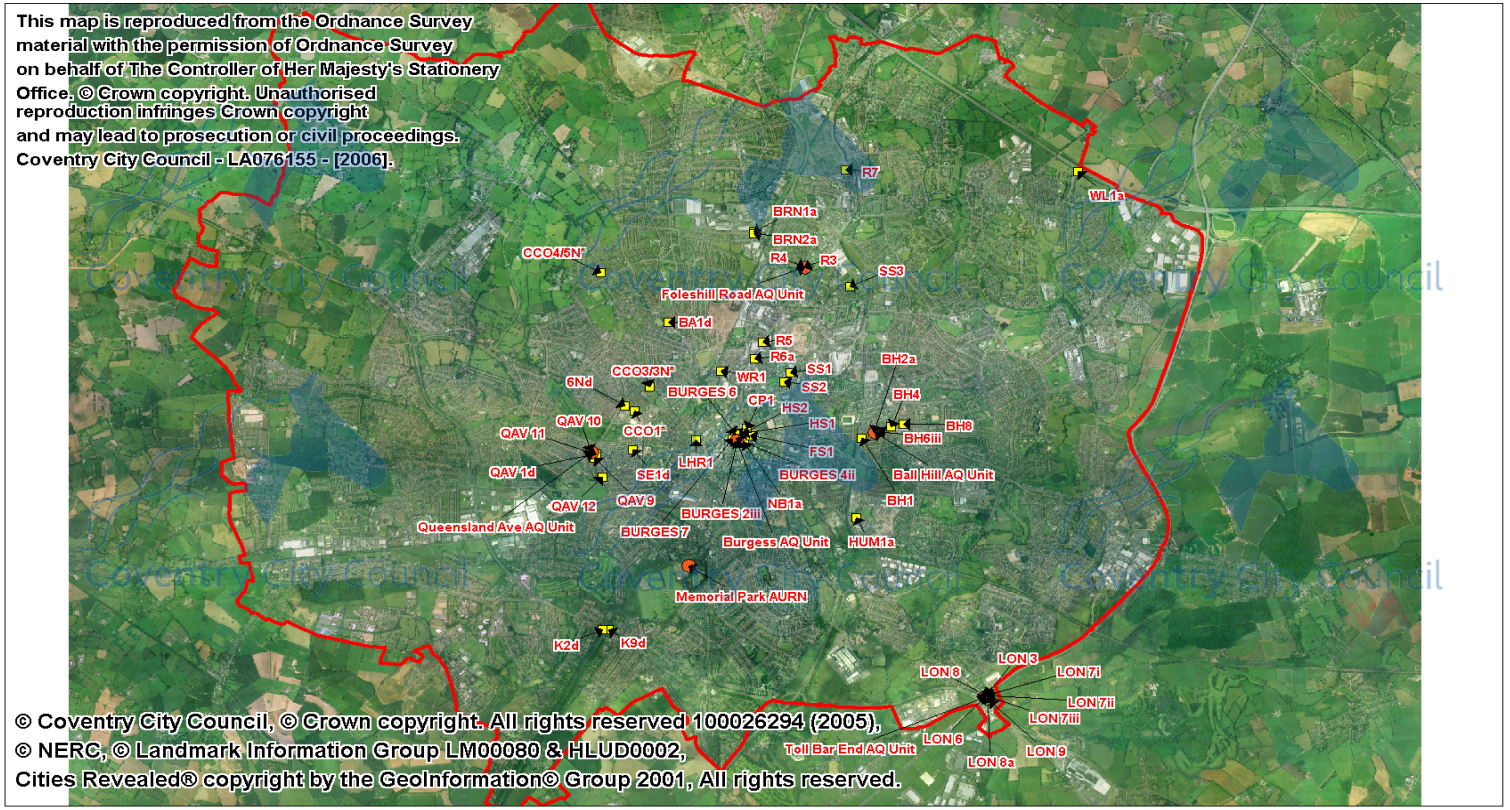

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Figure 1: Air Quality Monitoring Sites in Coventry

2 Carbon Monoxide

Carbon monoxide is produced by the incomplete burning of fossil fuels. Its main source is road transport, however in the last few years the increased technology in vehicles has improved the efficiency of fuel burning and led to a large decrease of carbon monoxide in the atmosphere.

Carbon monoxide reduces the bloods ability to carry oxygen to the tissues and due to this, people with existing heart or brain diseases are at particular risk from high levels of carbon monoxide.

The UK air quality objective for carbon monoxide is 10mg/m^3 for a maximum daily running eight-hour mean. The USA 2003 anticipated that the 2003 objective for carbon monoxide would be met in Coventry.

2.A Monitoring

Since 2003 carbon monoxide monitoring at Foleshill Road and London Road has ceased but continues at the AURN site in Coventry Memorial Park. The AURN is an urban background site. The results of carbon monoxide monitoring for 2005, taken from the National Air Quality Archive are shown below.

Data Capture: 88.65%
Exceedences of maximum daily running eight hour mean 2003: no exceedences
Annual Mean: 0.2 mg/m^3

2.B Road Traffic

LAQM.TG(03) Update USA checklist for carbon monoxide box 2.2 describes the process of identifying exceedences of carbon monoxide at very busy roads. The first step is the identification of "very busy" roads where the current year background concentration is expected to be above 1mg/m^3.

Background concentrations are composed of non-local sources such as traffic from a nearby city. The background concentration can often be the significant or dominant

factor. Using the 2001 background concentrations for carbon monoxide and correcting to future years using the information found on www.airquality.co.uk/archive/laqm/tools.php allows the background concentration for 2005 to be calculated. The background concentrations for every square kilometre within Coventry were shown to be below 0.4 mg/m^3 in 2005.

2.C Summary for Carbon Monoxide

It is unlikely that the UK objective for carbon monoxide will be exceeded in Coventry.

3 Benzene

The main source of benzene in the UK is from the combustion and distribution of petrol i.e., combustion in motor vehicles, petrol refining and distribution and uncontrolled emissions at petrol stations. Under EU legislation since January 2000 the amount of benzene in petrol has been below 1%. Benzene is a known carcinogen.

The UK air quality objective for benzene is currently a running annual mean of 16.25µg/m^3 (target date 2003), which represents an extremely small risk to health. There is a target of an annual mean of 5µg/m^3 to be achieved in England and Wales by 31st December 2010. The USA 2003 anticipated that both the 2003 and 2010 objectives for carbon monoxide would be met in Coventry.

3.A Monitoring data Outside an AQMA

In Coventry, Benzene monitoring is performed by pumped diffusion tube at the AURN site in Coventry Memorial Park. The AURN is an urban background site. The results of benzene monitoring for 2005, taken from the National Air Quality Archive are shown below.

Data Capture: greater than 75%
Annual mean 2005: 0.81µg/m^3

From Box 3.2 of the Updating and Screening Assessment checklist, the annual mean concentration may be assumed to be equivalent to the running annual mean concentration.

A benzene survey using passive diffusion tubes is being carried out in the Willenhall Wood area due to the concerns of local residents. The Willenhall Wood Survey is a 6-month survey that began at the beginning of December 2005 and is not due to be reported in September 2006. Results so far have been similar to co-located benzene diffusion tubes sited at the AURN.

3.B Monitoring data within an AQMA

There are no AQMA's for Benzene in Coventry.

3.C Road Traffic

LAQM.TG(03) Update USA checklist for benzene box 3.2 describes the process of identifying exceedences of benzene at very busy roads. The first step is the identification of "very busy" roads where the 2010 background concentration is expected to be above 2 µg/m^3.

Background concentrations are composed of non-local sources such as traffic from a nearby city. The background concentration can often be significant or dominant. Using the predicted 2010 background concentrations for benzene there are no areas within Coventry where the background concentration is predicted to be above 0.6µg/m^3. It is therefore unlikely that there will be exceedences at roadside sites.

3.D New Industrial Sources

There are no new industrial sources of benzene.

3.E Industrial Sources with substantially increased emissions

TG03 Appendix E describes a limited number of industrial processes that may provide sources of benzene. In the previous USA for Coventry it was noted that Dunlop Aviation Ltd is the only carbonisation process in Coventry. As this is not

noted on the Environment Agency's pollution inventory or Coventry City Council's public register, it is therefore is believed to have ceased operation or been reclassified.

3.F Petrol Stations

There has been one new petrol station in Coventry since the previous updating and Screening Assessment, but a number have closed. The new petrol station (Coventry City Council Permit 164) is owned by Tesco Stores Ltd and is sited at the Arena, A444 Phoenix Way, Coventry. Phoenix Way A444 has over 30,000 vehicles per day but there is no relevant exposure within 10m of the pumps.

3.G Major Fuel Storage Depots

There are no major fuel storage depots in Coventry.

3.H Summary for Benzene

It is unlikely that the UK objective for benzene will be exceeded in Coventry.

4 1,3-Butadiene

The majority of 1,3-butadiene in the atmosphere is due to the combustion of petrol and other materials, with motor vehicles being the primary source. Like benzene, 1,3-butadiene is a carcinogen and therefore the UK objective has been set so that the risks to health are extremely small.

The UK objective for 1,3-butadiene is a running annual mean of 2.25$\mu g/m^3$. The USA 2003 concluded that the UK objective for 1,3-butadiene would be met by the target date of 2003.

4.A Monitoring Data

Concentrations of 1,3-butadiene are not monitored in Coventry.

4.B New Industrial Sources

No new industrial sources emitting 1,3-butadiene have been established since the USA in 2003.

4.C Industrial Sources with substantially increased emissions

Of the processes noted as potentially emitting benzene in the previous USA, Acordis Speciality Fibres (EP Authorisation AA 3468) is not listed as releasing volatile organic compounds (VOC's) in 2005 and Notedome (EP Authorisation AU 7846), emitted less than 1000kg VOC's in 2005.

4.D Summary for 1,3-butadiene

It is unlikely that the UK objective for 1,3-butadiene will be exceeded in Coventry.

5 Lead

A ban on the sale of leaded petrol came into force in the UK on 1st January 2000 and has led to a significant reduction in the amount of airborne lead in the UK. The other major sources of lead are industrial applications such as battery manufacture and non-ferrous metal smelting. Lead is a toxic compound. The Air Quality Strategy states that the greatest cause for concern is its effects on brain development in children and the consequent impairment of IQ.

The UK objectives for lead are an annual mean of 0.5μg/m^3 by 2004 reducing to an annual mean of 0.25μg/m^3 by 31st December 2008. The USA performed in 2003 indicated that both the objectives for lead would be met in Coventry.

5.A Monitoring Data

Concentrations of lead are not monitored in Coventry.

5.B New Industrial Sources

There are no new industrial sources of lead in Coventry.

5.C Industrial Sources with substantially increased emissions

The USA 2003 reviewed emissions from Coventry and Solihull Waste Disposal Company (EP Authorisation AG7881), which emitted less than 100kg lead in 2005. It was noted that other Industrial Sources in Coventry had not increased emissions. Rohm and Haas has an Inorganic Chemical Process (EPA authorisation BP5697IL) emitting <20kg lead in 2005. Coventry City Council has been notified that Rohm and Haas in Coventry will close this year.

5.D Summary for Lead

It is unlikely that the UK objectives for lead will be exceeded in Coventry.

6 Nitrogen Dioxide

Oxides of nitrogen (NO_x) are produced when fossil fuels are burned in air. Oxides of nitrogen are mainly composed of nitric oxide (NO) and nitrogen dioxide (NO_2). The greatest source of NO_x is road transport, while power stations and industry are also sources. Cleaner technology has led to reduction in NO_x, however in some areas the increase in road traffic volume and primary emission of NO_2 from diesel engines has meant that NO_x levels have not been decreasing as expected.

There is evidence that high levels of NO2 can inflame the airways to the lungs and over a long time affect how well the lungs work. People with asthma are particularly affected. Nitrogen dioxide also has detrimental affects on vegetation.

The UK objectives for nitrogen dioxide are an annual mean of 40μ/m^3 and an hourly mean of not more than 18 exceedences of an hourly mean of 200μ/m^3 per year, both to be achieved by the target date of 31st December 2005. Coventry currently has three air quality management areas (AQMA's) due to expected exceedence of the annual mean for nitrogen dioxide.

6.A Monitoring Outside an AQMA

Coventry has three automatic monitoring stations for nitrogen dioxide outside of the AQMA's:

- AURN site, Coventry Memorial Park, urban background site
- Foleshill Road, roadside site
- Toll Bar End, roadside site

Monitoring is also performed using nitrogen dioxide passive diffusion tubes in areas identified as being of concern, during either USA 3 or using local knowledge.

6.A.1 Automatic Monitoring Data

Coventry Memorial Park

Data Capture	99%
Exceedences of 1 hour mean	no exceedences
Annual Mean	22 $\mu g/m^3$

(*from the National Air Quality Archive*)

Foleshill Road

Data Capture	92%
Exceedences of 1 hour mean	no exceedences
Annual Mean	28 $\mu g/m^3$

Tollbar End

Data capture for this unit over 12 months was 64%, however, the annual mean can only be quoted when data capture is above 90%. Data from air quality monitoring stations within 50km were used to estimate the annual mean from data collected in months with over 90% data capture, as described in box 6.5 of TG(03). The stations used were Walsall Alumwell (which although an urban background station is near to the M6 and has pollution levels similar to Tollbar End) and Oxford Centre, which is a roadside site.

Estimated Annual Mean 45μg/m^3 at roadside

99.8th percentile 139 μg/m^3

As the 99.8th percentile is below 200 μg/m^3 there is unlikely to be an exceedence of the hourly mean.

6.A.2 Passive Diffusion Tube Data

Diffusion tubes 20% TEA / water are supplied and analysed by Gradko International Limited.

Where the period of the diffusion tube survey was between 9 and 12 months, a bias correction factor was used for the Updating and Screening Assessment web site bias adjustment factor spreadsheet[i]. Bias adjustment factors for shorter periods were calculated using information from a collocation survey at the AURN site, Coventry Memorial Park using the method outlined in Box 6.4 of TG(03).

Results for each of the monitoring sites, outside of an AQMA, are summarised below. Where survey data was not available for a full 12 months correction factors were applied as described in Box 6.5 TG(03). All diffusion tubes either at building facades or corrected to façade using information on Review and Assessment web site below unless otherwise stated.

Full data, including bias adjustment factors and adjustments made for short survey times are shown in Appendix 2.

Urban Background sites

Site	Reference	Annual Mean 2005
Coundon Social Services, Moseley Avenue	CCO3/3N*	26
Brackley Close, Coundon	CCO4/5N*	26
AURN, Memorial Park	AUN1	21
AURN, Memorial Park	AUN2	20
AURN, Memorial Park	AUN3	25

Burnaby Road

Site	Reference	Annual Mean 2005
Burnaby Road, 16	BRN1	32
Burnaby Road, 16	BRN1a	33
Burnaby Road, 19	BRN2	39
Burnaby Road, 19	BRN2a	38

City Centre

Site	Reference	Annual Mean 2005
Nando's, New Buildings	NB1	36
Nando's, New Buildings	NB1a	37
Chauntry Place, 1	CP1	34
Croft Road*	CR2	45

*Based on survey initiated January 2006

Fletchampstead Highway / Kenpass Highway

Site	Reference	Annual Mean 2005
Fletchamstead Highway, 36	K1a	28
Fletchamstead Highway*	K2	62
Kenpas Highway, 33	K3a	26
Kenpas Highway/Green Lane	K4a	33
Kenpas Highway, 70	K6a	35
Kenpas Highway, 6	K7a	37
Fletchamstead Highway, 13	K8a	32
Kenilworth Road*	K9	37
Kenilworth Road*	K9d	33

*Roadside sites

Foleshill Road

Site	Reference	Annual Mean 2005
Foleshill Road AQ Station*	R1	38
Foleshill Road AQ Station*	R2	37
Foleshill Road AQ Station*	R3	38
Foleshill Road, Surestart	R4	42
Foleshill Road, 275	R5	43
Foleshill Road, 193	R6	47
Foleshill Road, 193	R6a	48
Foleshill Road, 1139	R7	37

*Collocation study at automatic monitoring station

Holyhead Road

Site	Reference	Annual Mean 2005
Holyhead Road, 131	HR2a	38
Holyhead Road, 247/249	HR3a	34
Holyhead Road, Abberdale Care Home	HR4a	35
Holyhead Road/Dover Street	HR5a	36
Lower Holyhead Road	LHR1	38

Humber Road

Site	Reference	Annual Mean 2005
Humber Road, 234	HUM1	30
Humber Road, 234	HUM1A	30

London Road /Tollbar Island

Site	Reference	Annual Mean 2005
London Road, Glengary Hotel	LON 3	41
London Road, AQ unit*	LON 4	53
London Road, AQ unit*	LON 5	51
London Road, AQ unit*	LON 6	51
London Road, Glengary Hotel	LON 7i	38
London Road, Glengary Hotel	LON 7ii	37
London Road, Glengary Hotel	LON 7iii	35
London Road, Glengary Hotel	LON 8	31
London Road, 703	LON 8a	39
London Road, 717	LON 9	28
London Road, 202	LON 10	27
London Road, 202	LON 10a	26

*Roadside

Radford Road / Beake Avenue Junction

Site	Reference	Annual Mean 2005
Beake Avenue/Radford Road	BA1	44*
Beake Avenue/Radford Road	BA1D	42*

*Roadside site, currently 7.5m from residential property but residential development is proposed and building has commenced. Therefore the results have not been corrected for distance to current residential property.

Sky Blue Way

Site	Reference	Annual Mean 2005
Trinity Point, Sky Blue Way	SBW1	25
Trinity Point, Sky Blue Way	SBW1A	32

Spon End / Hearsall Lane Junction

Site	Reference	Annual Mean 2005
Spon End, 58a	SE1	41
Spon End, 58a	SE1D	40

Stoney Stanton Road

Site	Reference	Annual Mean 2005
Stoney Stanton Road, 156	SS1	40
Stoney Stanton Road, 157	SS2	42

Widdrington Road / Sandy Lane Junction

Site	Reference	Annual Mean 2005
Widdrington Road, 1	WR1	36

Woodway Lane

Site	Reference	Annual Mean 2005
Jolly Collier, Woodway lane	WL1	33
Jolly Collier, Woodway lane	WL1A	35

6.B Monitoring Inside AQMA

Coventry has 3 AQMA's for nitrogen dioxide:

AQMA 1: the City Centre and is composed of an area in the region of Cross Cheaping, the Burges, Hales Street, Trinity Street, and Ironmonger Row.

AQMA 2: an area around the A4600 Walsgrave Road between Brighton Street and Shakespeare Street in the Ball Hill area of Coventry.

AQMA 3: an area surrounding the junction of Allesley Old Road B4106, Four Pounds Avenue and Queensland Avenue.

6.B.1 Automatic Monitoring Data

AQMA1: City Centre

The chemiluminescent monitor in AQMA 1 has had a high number of failures and lately it has also been identified that the nitrogen oxide cylinder used for calibration was contaminated. Due to this there is no reliable data from this air quality unit.

AQMA 2: Ball Hill

This monitoring station has also had a high number of failures, some due to being sprayed with anti-graffiti paint while operational, and also due to the failure of air conditioning. Health and Safety issues due to transferring a gas cylinder to the site for calibration have also been identified. There is insufficient scaled data to report results from this monitoring station.

AQMA 3: Queensland Avenue / Allesley Old Road

This monitoring station suffered from power failure and problems with ill-fitting zero air cylinders leading to periods with no data capture or lack of scaling. The annual mean has also been estimated by comparison with other air quality monitoring stations.

Data from air quality monitoring stations within 50km were used to estimate the annual mean from data collected in months with over 90% data capture, as described in box 6.5 of TG(03). Stations used were Walsall Alumwell (which although an urban background station is near to the M6 and has pollution levels similar to Queensland Avenue) and Oxford Centre, which is a roadside site.

Estimated Annual Mean $29 \mu g/m^3$ at roadside

99.8^{th} percentile $69 \mu g/m^3$

As the 99.8^{th} percentile is below 200 $\mu g/m^3$ there is unlikely to be an exceedence of the hourly mean.

6.B.2 Passive Diffusion Tube Data

See section 6.A.2 for information on methodology used for passive diffusion tube monitoring.

AQMA1

Site	Reference	Annual Mean 2005
Cross Cheaping	BUR 1	44
Cross Cheaping	BUR 2i	47
Cross Cheaping	BUR 2ii	48
Cross Cheaping	BUR 2iii	47
Burges	BUR 3	66
Burges	BUR 4i	57
Burges	BUR 4ii	75
Burges	BUR 4iii	78
Burges	BUR 5i	67
Burges	BUR 5ii	71
Burges	BUR5iii	64
Burges	BUR 6	55
Ironmonger Row	BUR 7	31
Trinity street	TS1	55
Trinity street	TS2	55
Trinity street	TS3	53
Hale Street*	HS1	44.1
Palmer Lane	HS2	36.4

*Roadside – boundary of potential development site, Palmer Lane is rear of development site.

AQMA 2: Ball Hill

Site	Reference	Annual Mean 2005
Walsgrave Road / Kingsway, next to Library	BH1	34
Walsgrave Road, 161	BH2a	46
Walsgrave Road	BH3a	48
Junction Walsgrave Rd & Clay Lane	BH4	41
Walsgrave Road, AQ unit*	BH6i	51
Walsgrave Road, AQ unit*	BH6ii	53
Walsgrave Road, AQ unit*	BH6iii	51
Walsgrave Road, Post office	BH7a	43
Walsgrave Road, 190	BH8	36
Walsgrave Road,	BH9	45

*****Roadside

AQMA 3: Queensland Avenue / Allesley Old Road

Site	Reference	Annual Mean 2005
Queensland Avenue, Fairytale Flowers	QAV 1	47.3
Queensland Avenue, Fairytale Flowers	QAV 1d	46.1
Queensland AQ unit	QAV 6*	32.9
Queensland AQ unit	QAV 7*	33.4
Queensland AQ unit	QAV 8*	34.0
Queensland Avenue, 81	QAV 9	50.7
Allesley Old Road, 164	QAV 10	33.1
Allesley Old Road, 87	QAV 11	32.8

*****Roadside

6.C Narrow, congested Streets

U.S.A 2003 concluded that the only streets in Coventry meeting the definition for this were Burges and Cross Cheaping. These streets now form part of AQMA1. Others

were identified from local knowledge and have been monitored using diffusion tubes in 2005.

6.D Junctions

These were identified for USA 2003. Of those identified, the junction of Queensland Avenue and Allesley Old Road has been declared as AQMA 3 following detailed assessment. Others were identified from local knowledge and have been monitored using diffusion tubes in 2005. Assessment by DMRB was begun and believed to be underestimating. To confirm that the DMRB was underestimating a receptor was chosen in an AQMA, where monitoring takes place. The levels of NO_2 predicted by DMRB were 11μgm^{-3} less those measured. As it was apparent that DMRB would not indicate any further areas than those already identified it was ceased.

6.E Busy Streets where People spend 1 hour or more close to Traffic

U.S.A 2003 concluded that the only streets in Coventry meeting the definition for this were Burges and Cross Cheaping. These streets now form part of AQMA1. Others were identified from local knowledge and have been monitored using diffusion tubes in 2005.

6.F Roads with High Flows of Buses and/or HGV's

These roads have been identified in USA 2003 or have been identified from local knowledge and have been monitored using diffusion tubes in 2005.

6.G New Road Constructed or Proposed since USA 2003

No new roads with have more than 10,000 vehicles per day have been constructed within Coventry since the previous USA.

6.H Roads with Significantly changed Traffic Flows or New Relevant Exposure

There are no roads in Coventry where traffic flow has been increased significantly since the previous USA. There are two sites in Coventry where residential property has been introduced to areas where diffusion tube monitoring has shown that nitrogen dioxide levels exceed the UK limit value. These are in the vicinity of Croft Road / Victoria Road in the city centre and at the junction of Beake Avenue / Radford Road. These areas have already been identified as requiring Detailed Assessment.

6.I Bus Stations

There is no relevant exposure within 10m of Poole Meadow bus station.

6.J New Industrial Sources

PMD (UK) Ltd is the only new industrial source of NO2 emissions in Coventry since 2003. The Environment Agency website classifies the process as Surface Treating Metal, Plastic (Authorisation number TP3935PJ). Appendix A2 does not note this type of process as releasing significant substances to air.

6.K Industrial Sources with significantly increased Emissions or Relevant New Exposure

There has been no significant increase from any industrial sources of NO_2 within Coventry.

6.L Aircraft

West Midlands International Airport is located within Warwickshire close to the Border with Coventry City. Expansion is proposed to raise the annual passenger number to ~2 million passengers per annum. The main impact of the airports expansion on local air quality is expected to be the impact of increased road traffic on residential exposure at Tollbar End, London Road that has been identified as an area for Detailed Assessment, as it was in USA 2003.

6.M Summary for NO_2

Monitoring within AQMA's has shown that nitrogen dioxide concentrations in these areas has not decreased, and has increased in places. Monitoring outside of AQMA's has demonstrated that a number of sites are above UK air quality limit value for annual mean NO2 and require Detailed Assessment. These are:

Foleshill Road
London Road / Tollbar Island
Radford Road / Beake Avenue junction:– (if residential property introduced)
Spon End / Hearsall Lane
Stoney Stanton Road
Croft Road, City Centre

There are two reasons why there is an increase in areas of nitrogen dioxide exceedence in Coventry. The major one is an increase in levels of nitrogen dioxide at busy roadsides within Coventry. Research by Dr David Carslaw of Leeds University[ii] has shown that there is an increase in the ratio of NO_2 / NO_x due to the increase in diesel vehicles and the emission of primary NO_2 from particle traps on buses. The second is the building of residential properties close to roadsides where there are high levels of nitrogen dioxide.

7 Sulphur Dioxide

Sulphur dioxide is produced by burning fossil fuels containing sulphur. The main source in the UK is from burning coal to produce electricity. Reductions in the use of solid fuel and sulphur in diesel and gas oil have led to a large decrease in the levels of sulphur dioxide in the last few years.

Sulphur dioxide is an irritant that affects the respiratory system when at high concentrations and there is some evidence that it has long-term health effects. Sulphur dioxide also contributes to particulate matter (Section 9).

There are three UK air quality objectives for sulphur dioxide: The 15 minute mean of 266$\mu g/m^3$ not to be exceeded more than 35 times a year by 31st December 2005, a one hour mean of 350 $\mu g/m^3$ not to be exceeded more than 24 times a year by 31st December 2004 and a 24 hour mean of 125$\mu g/m^3$ not to be exceeded more that 3 times per year by 31st December 2004.

The USA for Coventry in 2003 demonstrated that Coventry was likely to meet these objectives.

7.A Monitoring data outside an AQMA

Sulphur dioxide monitoring is performed at the AURN in the Memorial Park Coventry. This is an urban background site for 2005. Monitoring data from the National Air Quality Archive are shown below.

15 minute mean	No Exceedences
One hour mean	No Exceedences
24 hour mean	No Exceedences

7.B Monitoring data inside an AQMA

There are no AQMA's for sulphur dioxide within Coventry.

7.C New Industrial Sources

There are no new industrial sources of sulphur dioxide pollution in Coventry.

7.D Industrial Sources with substantially increased emissions or relevant new exposure

None of the processes reported in USA 2003 have increased sulphur dioxide emissions significantly.

7.E Domestic sources

Coventry is a Smoke Control Area and therefore has no areas of domestic fuel burning.

7.F Small Boilers > 5MW$_{(thermal)}$

There are no boilers in Coventry that are below 5MW and burn coal or fuel oil.

7.G Shipping

There is no shipping in Coventry.

7.H Railway Locomotives

There are no areas where diesel locomotives are regularly stationary for 15 minutes or longer close to sensitive locations. There are no coal fired steam locomotives in Coventry.

7.I Summary for Sulphur Dioxide

It is unlikely that the UK objective for sulphur dioxide will be exceeded in Coventry.

8 $PM_{(10)}$

$PM_{(10)}$ is the acronym for particulate materials, which are under 10 microns in size. Particulates come from a number of sources, which can be both natural and man-made. Some particulates are caused by interaction of other pollutants, such as ammonia reacting with nitrogen oxides and sulphur dioxide. In Coventry a large proportion of particulates are from road vehicles.

In the last few years, links have been found between day-to-day variations in levels of airborne particulates and health[iii]. These include daily deaths, admissions to hospital for the treatment of respiratory and cardiovascular diseases and symptoms amongst patients suffering from asthma. There is also evidence from the USA that long-term exposure to particulate air pollution is associated with a decrease in life expectancy. Although there are UK air quality objectives for particulate levels it is recognised that there is no safe threshold level for this pollutant.

In the England the current air quality objectives for particulates are:

- A 24 hour mean of 50 $\mu g/m^3$, not to be exceeded more that 35 time per year by 31st December 2004
- An annual mean of 40 $\mu g/m^3$ by 31st December 2004

The USA 2003 indicated that levels of PM10 from due to buses in Air Quality Management Areas 1 and 2 and emissions from "Express Asphalt" may lead to exceedence of the 2004 objective for PM10. However, following discussion with DEFRA it was decided to proceed to Detailed Assessment for NO2 only.

8.A Monitoring Outside an AQMA

Coventry has four automatic monitoring stations for PM10 outside of AQMA's:

- AURN site, Coventry Memorial Park, urban background site
- Foleshill Road, roadside site
- Toll Bar End, roadside site

Results are from TEOM analysers and have been corrected to the gravimetric equivalent. Where data capture was low the annual mean for the site is reported along with an estimate corrected by utilising data from AURN's at Coventry, Leicester Centre, Wolverhampton Centre and Northampton.

Coventry Memorial Park

Data Capture	98.9%
Annual Mean	19 $\mu g/m^3$
Exceedences of 24 hour mean	1

(*from the National Air Quality Archive*)

Foleshill Road

Data Capture	85%
Annual Mean	21.9 $\mu g/m^3$
Estimated Annual Mean	21.9 $\mu g/m^3$
90th percentile	32.2 $\mu g/m^3$

Queensland Avenue

Data Capture	75%
Annual Mean	20.0 $\mu g/m^3$
Estimated Annual Mean	19.8 $\mu g/m^3$
90th percentile	32.4 $\mu g/m^3$

Tollbar End

Data Capture	61%
Annual Mean	27.8 μg/m^3
Estimated Annual Mean	25.8 μg/m^3
90th percentile	40.3 μg/m^3

All sites show a 90th percentile of less than 50μg/m^3 demonstrating that none of the areas monitored exceed the 2004 objective of no more than 35 exceedences of the 24 hour mean.

8.B Monitoring data within an AQMA

Coventry has no AQMA's for PM_{10}.

8.C Busy Roads and Junctions in Scotland

Not applicable.

8.D Junctions

Exceedence at junctions was considered in detail in the USA 2003. It was noted that Junction 5 of the Ringway may exceed the 24 hour mean and would be considered during detailed assessment. However it was later agreed with DEFRA that DMRB had over-estimated the result and that this was not necessary. Re-consideration of Junction 5 using DMRB indicates that the annual average in 2005 would have been 34.6 but there would be 48 days of exceedence of the 24 hour mean. However DMRB cannot account for the Ringway being in an underpass below the level of the receptor and the junction and therefore is likely to overestimate levels of PM_{10} in this area.

8.E Roads with a High Flow of Buses and/or HGV's

According to data from PRISM, supplied by Mott MacDonald, there are no roads in Coventry with an ADDT of over 20% HGV's and/or buses numbering more than 2000 vehicles per day. The roads in AQMA 1 have a high proportion of buses but a low total ADDT.

8.F New Road Constructed or Proposed since last USA

No new roads with have more than 10,000 vehicles per day have been constructed within Coventry since the previous USA.

8.G Roads with Significantly changed Traffic Flows or New Relevant Exposure

There are no roads in Coventry where traffic flow has been increased significantly since the previous USA.

8.H Roads Close to the Objective during the second round of Review and Assessment

USA 2003 stated that there were no roads close to the objective in the first round of Review and Assessment. No roads were identified as being close to the objective in 2003.

8.I New Industrial sources

There are no new industrial sources of PM10's within Coventry.

8.J Industrial Sources with Substantially Increased Emissions

There has been no significant increase in PM_{10} from any industrial sources within Coventry.

8.K Areas with domestic Solid Fuel Burning

Smoke Control Areas cover all of Coventry under part III of The Clean Air Act 1993 therefore domestic solid fuel burning is not significant in Coventry.

8.L Quarries / Landfill sites / opencast coal etc.,

There are no sources of significant fugitive dust emissions in Coventry.

8.M Aircraft

West Midlands International Airport is located within Warwickshire close to the boundary with Coventry City. Expansion is proposed to raise the annual passenger number to ~2 million passengers per annum, considerably lower than the level needed to trigger a detailed assessment.

8.N Summary for PM_{10}

It is unlikely that the UK objective for PM_{10} will be exceeded in Coventry.

9 Conclusions

For the majority of pollutants that Local Authorities are required to assess under the USA, levels of pollution in Coventry still remain below the UK objectives. The exception to this is nitrogen dioxide where more areas have been found to exceed the UK objective of annual mean of 40$\mu g/m^3$. Areas found to exceed this objective in 2005 were:

Foleshill Road
London Road / Tollbar Island
Radford Road / Beake Avenue junction:– (if residential property introduced)
Spon End / Hearsall Lane
Stoney Stanton Road
Croft Road, City Centre

Given the number of areas to proceed to Detailed Assessment it is highly likely that Coventry will have to declare further Air Quality Management Area's.

10 Comments

Coventry City Council has proposed an increase in the population of Coventry from the current level of 300,844 (measured in the census in 2001) to over 400,000 within the next 10 to 15 years. The amount of commercial property is also set to increase. To decrease the level of air pollution in the City in these conditions will require an innovative transport plan, which limits transport fuelled by fossil fuels to a sustainable level.

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[i] http://www.uwe.ac.uk/aqm/review/diffusiontube310306.xls

[ii] "Evidence of an Increasing NO_2/NO_x emissions ratio from road traffic emissions" David C Carslaw, Atmospheric Environment, volume 39 (2005), Elsevier.

[iiiiii] "The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – A consultation document for options for further improvements in air quality" DEFRA, April 2006.

Appendix 1: Table of Diffusion Tube Information

Reference	Siting Category	Easting	Northing	Distance to Road (m)	Distance to Building (m)	Height (m)	Months	Average	Bias	Corrected	AM/PM	Annual mean	AM at façade
HR2a	Façade	432487	279343	6.8	0.0	2.5	6	41.8	0.937	39.2	0.974	38	38
HR3a	Façade	431841	279692	15.3	0.0	2.5	6	37.1	0.937	34.7	0.974	34	34
HR4a	Façade	432659	279255	1.5	0.0	2.5	6	38.3	0.937	35.9	0.974	35	35
HR5a	Façade	432779	279197	6.3	0.0	2.5	6	39.3	0.937	36.8	0.974	36	36
LHR1	Roadside	432880	279180	5.6	0.9	3	10	39.2	0.990	38.8	0.974	38	38
6N*	Roadside	432105	279578	3.1	7.2	1.6	12	52.3	0.990	51.7		54	
CCO1*	Roadside	432299	279898	59	5.8	2.7	11	45.6	0.990	45.1	0.99	45	
CCO3/3N*	Urban background	431683	281446	1.2	6.9	2.5	11	24.1	0.990	23.8	1.097	26	
CCO4/5N*	Urban background	431990	279644	3.4	7.2	1.6	12	26.1	0.990	25.9		26	
BH1	Roadside	434966	279204	2.6	5.2	3.5	12	38.6	0.990	38.2		38	34
BH2a	Façade	435125	279284	3.9	0.0	2.8	12	46.2	0.990	45.7		46	46
BH3a	Façade	435272	279313	4.4	0.0	2.5	6	52.9	0.937	49.6	0.974	48	48
BH4	Roadside	435331	279358	1.3	5.3	1.8	12	45.6	0.990	45.2		45	41
BH6i	Roadside	435181	279294	4.5	3.4	3.1	11	52.4	0.990	51.9	0.977	51	48
BH6ii	Roadside	435181	279294	4.5	3.4	3.1	12	53.8	0.990	53.3		53	51
BH6iii	Roadside	435181	279294	4.5	3.4	3.1	12	51.3	0.990	50.8		51	48
BH7a	Façade	435246	279323	4.6	0.0	3	5	46.5	0.980	45.6	0.931	43	43
BH8	Façade	435490	279392	5.5	0.0	2.5	6	38.6	0.889	34.3	1.035	36	36
BH9	Roadside	435640	279372	0.5	6.4	2.7	3	40.3	0.959	38.6	1.281	49	45
K1a	Façade	431499	276749	15.3	0.0	2	5	30.3	0.982	29.8	0.93	28	28
K2	Roadside	431709	276617	3.8	14.0	2	11	59.1	0.990	58.5	1.064	62	
K3a	Façade	431964	276483	14.8	0.0	2	5	28.8	0.982	28.3	0.93	26	26
K4a	Kerbside	432207	276342	1.5	0.0	2	4	37.1	0.982	36.4	0.912	33	33
K6a	Façade	432054	276381	13.6	0.0	2	5	37.9	0.982	37.3	0.93	35	35
K7a	Façade	431818	276526	2.4	0.0	2	5	40.2	0.982	39.5	0.93	37	37
K8a	Façade	431580	276653	8.8	0.0	2	5	35.4	0.982	34.8	0.93	32	32
K9	Roadside	431782	276618	5	39.8	2.7	6	39.9	0.889	35.5	1.035	37	
K9d	Roadside	431782	276618	5	39.8	2.7	6	35.5	0.889	31.6	1.035	33	
BUR 1	Kerbside	433389	279142	1.1	6.7	2.5	6	53.8	0.937	50.4	0.974	49	44
BUR 2i	Kerbside	433398	279168	0.5	7	3	10	47.5	0.990	47.0	1.111	52	47
BUR 2ii	Kerbside	433398	279168	0.5	7	3	12	52.3	0.990	51.8	1.03	53	48
BUR 2iii	Kerbside	433398	279168	0.5	7	3	12	51.6	0.990	51.1	1.03	53	47
BUR 3	Kerbside	433379	279185	1.5	2.9	3	5	76.3	0.980	74.8	0.931	70	66
BUR 4i	Kerbside	433387	279199	0.5	1.2	3	6	61.9	0.889	55.0	1.035	57	57
BUR 4ii	Kerbside	433387	279199	0.5	1.2	3	9	75.0	0.990	74.3	1.006	75	75
BUR 4iii	Kerbside	433387	279199	0.5	1.2	3	11	71.5	0.990	70.8	1.097	78	78
BUR 5i	Kerbside	433369	279226	1.5	2.8	3	6	76.9	0.937	72.1	0.974	70	67
BUR 5ii	Kerbside	433369	279226	1.5	2.8	3	6	81.4	0.937	76.3	0.974	74	71
BUR5iii	Kerbside	433369	279226	1.5	2.8	3	5	74.2	0.982	72.9	0.93	68	64
BUR 6	Kerbside	433373	279257	1	1.8	3	12	55.7	0.990	55.2		55	55
BUR 7	Roadside	433345	279189	0.5	8	2.5	6	36.9	0.889	32.8	1.035	34	
TS1	Roadside	433467	279200	3.6	3	2.5	5	64.0	0.929	59.4	0.98	58	55
TS2	Roadside	433465	279154	4.4	3.7	2.5	6	63.5	0.937	59.5	0.974	58	55
TS3	Roadside	433505	279224	3.8	3.8	2.5	6	61.5	0.937	57.6	0.974	56	53
HS1	Roadside	433468	279266	0.9	24.6	3	5	50.1	0.881	44.1	0.983	43	
HS2	Roadside	433416	279235	3.2	2	3	5	41.8	0.871	36.4	0.997	36	
NB1	Façade	433487	279143	4.1	0	2.5	5	41.2	0.871	35.8	0.997	36	36
NB1a	Façade	433487	279143	4.1	0	2.5	6	40.6	0.889	36.1	1.035	37	37
CP1	Façade	433522	279339	8.1	0	3	6	36.8	0.889	32.7	1.035	34	34
LON 3	Façade	436544	275729	10.7	0	1.8	12	40.9	0.990	40.5		41	41
LON 4	Roadside	436520	275705	5.9	26.3	3.1	12	53.7	0.990	53.2		53	
LON 5	Roadside	436520	275705	5.9	26.3	3.1	12	51.7	0.990	51.2		51	
LON 6	Roadside	436520	275705	5.9	26.3	3.1	12	51.4	0.990	50.9		51	
LON 7i	Façade	436540	275725	19.4	0	2.5	6	41.0	0.889	36.4	1.035	38	38
LON 7ii	Façade	436543	275718	18.3	0	2.5	6	40.6	0.889	36.1	1.035	37	37
LON 7iii	Façade	436546	275711	17.9	0	2.5	6	38.0	0.889	33.8	1.035	35	35
LON 8	Façade	436548	275712	19.4	0	2.5	4	38.8	0.860	33.3	0.931	31	31
LON 8a	Façade	436551	275703	17.9	0	2.5	6	42.2	0.889	37.5	1.035	39	39
LON 9	Façade	436582	275654	18.5	0	2	6	30.0	0.889	26.6	1.035	28	28
LON 10	Façade	435387	276959		0	2.5	6	29.3	0.889	26.0	1.035	27	27
LON 10a	Façade	435387	276959		0	2.5	6	28.5	0.889	25.3	1.035	26	26
WL1	Façade	437687	282810	18.7	0	2.7	6	35.5	0.889	31.5	1.035	33	33
WL1a	Façade	437687	282810	18.7	0	2.7	6	37.5	0.889	33.4	1.035	35	35
BA1	Roadside	432531	280769	2.2	7.5	3	12	44.0	0.990	43.5		44	
BA1d	Roadside	432531	280769	2.2	7.5	3	12	42.4	0.990	42.0		42	
SE1	Façade	432091	279042	3.4	0	2	11	41.3	0.990	40.9	1.004	41	41
SE1d	Façade	432091	279042	3.4	0	2	11	39.8	0.990	39.4	1.004	40	40
QAV 1	Façade	431590	278988	5.3	0	2.5	10	44.6	0.990	44.1	1.073	47	47
QAV 1d	Façade	431590	278988	5.3	0	2.5	10	43.4	0.990	42.9	1.073	46	46
QAV 6	Roadside	431573	279020	5	10.8	3.1	10	33.8	0.990	33.5	0.983	33	
QAV 7	Roadside	431573	279020	5	10.8	3.1	11	33.6	0.990	33.3	1.004	33	

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