CITY OF WOLVERHAMPTON COUNCIL

Response to Request for Information

Reference FOI 00190
Date 06 November 2017

Air Quality

Request:

Could you share with me the City of Wolverhampton Council's Air Quality Progress Reports for years 2014,2013 and 2011, and City of Wolverhampton Council's Air Quality Updating and Screening Assessment for 2012?

In response to your request, please find attached copy of the reports.

2011 Air Quality Progress Report for

Wolverhampton City Council

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

April 2011

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Executive Summary

This progress report has been produced as part of the on going process of the review and assessment of air quality to provide an update on local air quality management within the city of Wolverhampton.

The report presents monitoring data for the year 2010 and considers any new local developments which have taken place in the city since the previous Progress Report published in September 2010.

A review of emission sources has found that there have been no new industrial processes, or any other significant sources granted planning approval which could contribute to poor air quality since the last Progress Report carried out in 2010.

A comprehensive review of all monitoring data gathered since the previous report has been carried out. Areas where the air quality objectives are not being met have been identified together with any significant trends.

Recent monitoring data has identified that air quality improved across the city during 2010. This has resulted in a reduction in the number of areas within Wolverhampton which are exceeding the objectives.

Wolverhampton City Council has concluded that a detailed assessment will not be required.

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1 Introduction

1.1 Description of Local Authority Area

Located to the north of the West Midlands conurbation, Wolverhampton is on the edge of the Black Country, some 15 miles from the regional centre of Birmingham. Wolverhampton functions as a major centre within the Black Country and the northern part of the West Midlands.

The city covers an area of 26 square miles (6,880 hectares) and has a population of around 250,000 residents. Wolverhampton is primarily an urban area with the majority of the land use being residential and industrial. However, there are areas of green space, allotments, sports grounds, isolated pockets of countryside, small lakes and ponds and farm land which make up approximately 13% of the city. These provide a variety of habitats for a wide range of plant and animal species.

Wolverhampton benefits from good communications links, with access to the national motorway network provided by the M6 to the east, the M54 to the north, and the newly completed M6 Toll. Wolverhampton also has a mainline railway station, which provides direct trains to Birmingham, London, the West Country and the north. Proposals are currently underway to introduce a number of improvements to the railway station and its environs through the city Interchange project.

The two principal pollutants affecting the local air quality are nitrogen dioxide (NO2) and fine particles (PM_{10}). The major source of these pollutants is road traffic and there are a number of roads within the city where the air quality objectives for NO2 and PM_{10} are being exceeded. These are primarily narrow congested streets within the town centre which have high levels of bus traffic. In response the Council declared the whole city an Air Quality Management Area (AQMA) in March 2005.

An Air Quality Action Plan (AQAP) has been prepared in conjunction with a cross service officer group and the local transport plan.

1.2 Purpose of Progress Report

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as the Updating and Screening Assessment Report. If the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to Local Air Quality Management (LAQM) **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), and the Air Quality (England) (Amendment) Regulations 2002 (SI 3043). They are shown in

Table 1.1, which includes the number of permitted exceedences in any given year (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Assessment	Exceedences	Conclusions and Recommendations
Stage 1 Report- March 1999	Non	The report Identified 54 roads and 143 industrial processes within Wolverhampton which have the potential to be significant sources of pollution.
Stage 3 Report July 2001	Non	A recommendation to carryout detailed investigations regarding the levels of NO2 to confirm the prediction of the model. Further monitoring for NO2 and PM_{10} is required along busy roads and roads with high flows of bus traffic
USA May 2003	Nitrogen dioxide, particles	Identified certain areas within the city where the objectives are likely to be exceeded. A Detailed Assessment of NO2 and PM_{10} is required for parts of the city Centre and two of the busiest junctions.
Detailed Assessment 2004	Nitrogen dioxide, particles	The Detailed Assessment confirmed that the objectives for NO2 and PM_{10} were not being met along certain roads within the city centre and recommended the declaration of an AQMA
Section 83 (1) March 2005	Nitrogen dioxide, particles	Order designating the city of Wolverhampton an Air Quality Management Area (Appendix 1)
Annual Progress Report 2005	Nitrogen dioxide, particles	Confirmed conclusions of the Detailed Assessment and highlighted three new key developments for consideration in the 2006 USA
USA, Stage 4 Assessment and Action Plan 2006	Nitrogen dioxide, particles	Analysis of monitoring data showed that NO2 concentrations had reduced from 2003 peak levels but continued to exceed the objectives at certain locations within the city. The levels of PM_{10} fell below the objectives during 2004 and 2005 and projected figures indicated a continuing downward trend. Nine new developments which required air quality assessments were considered. It was concluded that the developments would not result in the air quality objectives being exceeded. The action plan listed 23 actions and incorporated the Local Transport Plan into the long term air quality strategy.
Progress Report 2007	Nitrogen dioxide, particles	Monitoring data for 2006 showed the levels of NO2 and PM_{10} increased contrary to the projected concentrations contained in the 2006 USA. Parts of the city Centre and certain busy road junctions continue to exceed the objectives for NO2 and PM_{10}. There have been no new industrial processes or any other significant developments which could contribute to poor air quality since the 2006 USA.
Progress Report 2008	Nitrogen dioxide, particles	Levels of NO2 and PM_{10} remain stable. There have been no new industrial processes or any other significant developments which could contribute to poor air quality since the 2006 USA.

Assessment	Exceedences	Conclusions and Recommendations
USA, Stage 4 Assessment and Action Plan 2009	Nitrogen dioxide	There are no new or significantly changed sources which could give rise to any potential exceedences outside the existing AQMA and therefore, it is not necessary to proceed to a Detailed Assessment for any of the pollutants listed in Table 1.1 Additional monitoring, or changes to the existing monitoring programme is not required. Wolverhampton City Council intends to submit the 2010 Progress Report as required by the Review and Assessment process. If monitoring data for PM_{10}'s continues to indicate compliance with the air quality objectives, it may be necessary to progress a Detailed Assessment for PM_{10} to determine if PM_{10} can be removed from the AQMA.
Progress Report 2010	Nitrogen dioxide	Recent monitoring data has identified that air quality improved across the city during 2009. This has resulted in a reduction in the number of areas within Wolverhampton which are exceeding the objectives. The Council has concluded that a detailed assessment will not be required

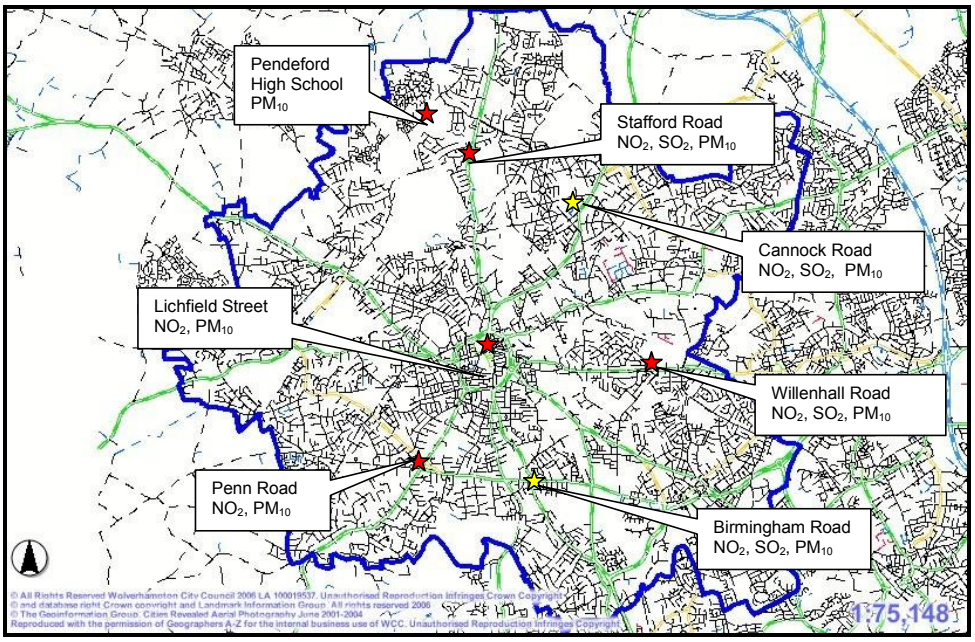
2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Wolverhampton CC operates 5 fully automatic monitoring stations, the locations of which are shown in Figure 2.1 below. These sites cover the main arterial roads which link the city with major regional trunk roads and motorways. With the exception of the back ground site at Pendeford High School they have been chosen to represent the worst case locations

Figure 2.1 Location of Automatic Monitoring Sites



Current automatic monitoring sites

Closed automatic monitoring sites

Wolverhampton City Boundary

Fixed stations are located on the A449 Stafford Road to the north which links with the M54, the A449 Penn Road to the south, and Lichfield Street which is the main access roads into the bus station and has a high flow of bus traffic.

The Council also operates a mobile monitoring station which is currently located on the A454 Willenhall Road, a main link to the M6 and Walsall. Prior to this the mobile monitor was located on the A4123 Birmingham New Road and the A460 Cannock Road.

In addition to the roadside monitors, a PM_{10} monitor is located at Pendeford High School within the school grounds. This site is about 180m from the nearest road and provides data relating to background levels of particles within the city.

Details of these sites are given in Table 2.1 below.

Table 2.1 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In an AQMA?	Relevant Exposure?	Distance to kerb of nearest road	Worst-case Location?
	Current sites							
A1	Lichfield Street	Roadside	391647 298784	NO2, PM10	Yes	Yes (5m)	2.6m	Yes
A2	Penn Road	Roadside	390374 296775	NO2, PM10	Yes	Yes (10m)	5m	Yes
A3	Pendeford High School	Urban background	390740 302692	PM10	Yes	No	180m	No
A4	Stafford Road	Roadside	391261 302199	NO2, SO2 PM10	Yes	Yes (15m)	8m	Yes
A5	Willenhall Road	Roadside	394754 298429	NO2, SO2 PM10	Yes	Yes (10m)	10m	Yes
	Closed sites							
A6	Cannock Road	Roadside	393030 300824	NO2, SO2 PM10	Yes	Yes (17m)	6m	Yes
A7	Birmingham New Road	Roadside	392264 296546	NO2, SO2 PM10	Yes	Yes (3m)	6m	Yes
A8	St Peter's Square	Background	391357 298939	NO2, SO2 PM10, CO O3	Yes	No	30m	No

2.1.2 Non-Automatic Monitoring

To complement the automatic sites NO2 sampling is also carried out using passive diffusion tubes supplied and analysed by Gradko. The Council has tubes at 54 locations around the city.

The sites represent a combination of background, intermediate, and roadside locations intended to reflect the worst case situation where the general public are likely to be exposed.

Table 2.2a Details of Non- Automatic Monitoring Sites (Roadside)

Site Name	Site Type	OS Grid Ref		In AQMA?	Relevant Exposure?	Distance to kerb of nearest road	Worst-case Location?
BIL1	Roadside ISA	395057	296541	Y	Y(4m)	4m	Y
BIL2	Roadside ISA	395085	296475	Y	Y(4M)	4.5M	Y
BIL3	Roadside ISA	395102	296495	Y	N	10M	Y
BIL4	Roadside ISA	395117	296454	Y	Y(2.5M)	2.5M	Y
LIC1	Roadside ISA	391698	298776	Y	N	3.5M	Y
LIC2	Roadside ISA	391508	298744	Y	Y(3M)	3M	Y
LIC3	Roadside ISA	391620	298772	Y	N	6M	Y
LIC4	Roadside ISA	391643	298786	Y	Y(1.5M)	3M	Y
LIC5	Roadside ISA	391643	298786	Y	Y(1.5M)	3M	Y
LIC6	Roadside ISA	391643	298786	Y	Y(1.5M)	3M	Y
LIC7	Roadside ISA	391019	296671	Y	N	5M	Y
LIC8	Roadside ISA	391454	298733	Y	N	3M	Y
LIC9	Roadside ISA	390375	296775	Y	Y(3M)	3M	Y
PIP1	Roadside ISA	391768	298662	Y	N	2M	Y
PIP2	Roadside ISA	391794	298560	Y	N	4M	Y
PRI1	Roadside ISA	391548	298940	Y	N	3M	Y
PRI2	Roadside ISA	391566	298795	Y	Y(3M)	3M	Y
PRI3	Roadside ISA	391607	298745	Y	Y(4.5M)	4.5M	Y
PRI4	Roadside ISA	391581	298686	Y	N	5M	Y
PRI5	Roadside ISA	391588	298612	Y	N	2.5M	Y
QUE1	Roadside ISA	391607	298652	Y	Y(2.5)	2.5M	Y
QUE2	Roadside ISA	391622	298639	Y	N	4.5M	Y
QUE3	Roadside ISA	391662	298665	Y	Y(2.5)	2.5M	Y
QUE4	Roadside ISA	391707	298660	Y	N	1.5M	Y
STA1	Roadside ISA	391377	299818	Y	Y(4M)	2M	Y
STA2	Roadside ISA	391270	300718	Y	Y(15M)	6M	Y
STA3	Roadside ISA	391285	301054	Y	Y(13M)	13M	Y
STA4	Roadside ISA	391179	301534	Y	Y(10M)	13M	Y
STA5	Roadside ISA	391261	302199	Y	Y(8.5M)	15M	Y
STA6	Roadside ISA	391261	302199	Y	Y(8.5M)	15M	Y
STA7	Roadside ISA	391261	302199	Y	Y(8.5M)	15M	Y
STA8	Roadside ISA	391317	302631	Y	Y(17M)	17M	Y
STA9	Roadside ISA	391527	303350	Y	Y(12M)	4.5M	Y
TEM1	Roadside ISA	391543	298270	Y	N	1.5M	Y
TEM2	Roadside ISA	391446	298269	Y	N	1.5M	Y
TEM3	Roadside ISA	391268	298274	Y	N	1.5M	Y
WIL1	Roadside ISA	394266	298438	Y	Y(14.5M)	3.5M	Y
WIL2	Roadside ISA	394712	298428	Y	Y(6.5M)	6.5M	Y
WIL3	Roadside ISA	394754	298429	Y	Y(11M)	10M	Y
WIL4	Roadside ISA	394754	298429	Y	Y(11M)	10M	Y
WIL5	Roadside ISA	394754	298429	Y	Y(11M)	10M	Y
BIR	Roadside	392306	296547	Y	Y(4M)	2M	Y
BRI	Roadside	388182	298782	Y	Y(12M)	2M	Y
BRO	Roadside	391676	298865	Y	Y(5.5M)	5.5M	Y
CAN	Roadside	393008	300867	Y	Y(14M)	6.5M	Y
CLE	Roadside	391485	298348	Y	N	5M	Y
CUL	Roadside	393371	297403	Y	Y(2.5M)	2.5M	Y
DUD	Roadside	391541	297267	Y	Y(4.5M)	3.5M	Y
NEA	Roadside	394717	299894	Y	Y(6.5M)	2M	Y
ROC	Roadside	388995	300096	Y	Y(2.5M)	1.5M	Y
TRI	Roadside	395540	296479	Y	Y(10M)	15M	Y
WAT	Roadside	391134	298877	Y	Y(11M)	3M	Y
WOL	Roadside	394031	297172	Y	Y(6M)	2M	Y

Table 2.2b Details of Non- Automatic Monitoring Sites (Intermediate and Background)

Site Name	Site Type	OS Grid Ref		In AQMA?	Relevant Exposure?	Distance to kerb of nearest road	Worst-case Location?
PRO	Intermediate	394633	296089	Y	N	28M	N
SPS	Intermediate	391357	298937	Y	N	30M	N
COL	Background	395855	300586	Y	N	48M	N
COLQ	Background	395855	300586	Y	N	48M	N
MAR	Background	390705	302736	Y	N	165M	N
WAR	Background	389132	296755	Y	N	50M	N
WRE	Background	392090	296095	Y	N	50M	N

Following the 2001 Stage 3 report a number of roads were designated as intensive survey areas (ISA's). The roads which have been targeted are the main arterial routes into the city centre and those streets which are narrow and congested or have a high proportion of heavy duty vehicles (HDV's). A total of 5 diffusion tubes have been sited in a "W" formation along each of these roads.

Wherever possible, diffusion tubes are located on the façades of residential property. Where this is not possible tubes are attached to lampposts or other suitable street furniture.

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

Data from the automatic monitoring stations is presented in Table 2.3a and Table 2.3b below; exceedences of the objectives are highlighted in bold. Table 2.3a shows that the annual average continues to exceed the objective level at Penn Road and Willenhall Road. Levels of NO2 have dropped significantly at Lichfield Street due to the temporary road closure to allow improvements to the bus station.

Table 2.3a Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2010 %	Annual mean concentrations (µg/m^3)		
				2008	2009	2010
A1	Lichfield Street	Y	99	**61**	**59**	40
A2	Penn Rd	Y	96	**48**	**46**	**46**
A4	Stafford Rd	Y	99	40	38	38
A5	Willenhall Rd/Neachells Lane	Y	96	40	36	**46**

Table 2.3b Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2010 %	Number of Exceedences of hourly mean (200 µg/m^3)		
				2008	2009	2010
A1	Lichfield Street	Y	99	2	6	0
A2	Penn Rd/Goldthorne Hill	Y	96	0	1	0
A4	Stafford Rd/Church Rd	Y	99	0	0	0
A5	Willenhall Rd/Neachells Lane	Y	96	0	1	4

Diffusion Tube Monitoring Data

Diffusion tube results for 2010 are shown in Table 2.4a. The annual average for each site is presented as bias corrected measured value and has been corrected for distance to relevant receptor in accordance with the procedure detailed in Box 2.3 of technical Guidance LAQM.TG(09). Exceedences of the annual mean objective value are highlighted in bold.

The bias is obtained using co-location of triplicate tubes along side the continuous monitoring stations.

Table 2.4b provides a summary of the results from the ISA's, the remaining roadside tubes and the background tubes for 2008, 2009 and 2010. The results are presented as the mean concentration calculated from the individual tubes located along each particular road corrected for bias and distance.

In April 2010 work started on the Wolverhampton interchange project. To enable the works to begin Lichfield Street was closed to bus traffic and temporary bus stop established in Queen Street.

The interchange project is an integral part of the council's air quality management plan. Phase I of the project is due to be completed in summer 2010 and involves the redevelopment of the bus station with a new access road off the ring road. The new access road will reduce the amount of bus traffic within the town centre and improve air quality along several roads within the ring road.

The closure of Lichfield Street has lead to a substantial reduction in NO2 concentrations in Lichfield Street east of the Princess Street junction. However the temporary bus stops in Queen Street have caused an increase in NO2 levels along this road.

The data collected from the automatic monitoring stations and the diffusion tube sites has identified that the annual mean NO2 objective was exceeded during 2010 at the following locations within the city:

Road side ISA's:

- Pipers Row
- Princess Street
- Queen Street

Roadside point locations:

- Broad Street
- Birmingham Road
- Old Hill, Tettenhall
- Penn Road/Goldthorne Hill Junction
- Willenhall Road/Neachells Lane junction

Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Annual mean concentrations (µg/m^3) adjusted for bias	
			Measured value	Measured value corrected for distance
BIL1	Lichfield St, Bilston	Y	**46**	**45**
BIL2	Lichfield St, Bilston	Y	38	37
BIL3	Lichfield St, Bilston	Y	36	36
BIL4	Lichfield St, Bilston	Y	39	38
LIC1	Lichfield St	Y	38	38
LIC2	Lichfield St	Y	**47**	**46**
LIC3	Lichfield St	Y	**42**	**41**
LIC4[1]	Lichfield St	Y	**42**	40
LIC7	Lichfield St	Y	40	39
LIC8	Lichfield St	Y	38	37
LIC9	Lichfield St	Y	**41**	**41**
PIP1	Pipers Row	Y	**42**	**42**
PIP2	Pipers Row	Y	**43**	**43**
PRI1	Stafford St	Y	**43**	**42**
PRI2	Princess Sq	Y	**44**	**44**
PRI3	Princess St	Y	39	39
PRI4	Princess St	Y	**50**	**49**
PRI5	Princess St	Y	**43**	**42**
QUE1	Queen St	Y	**44**	**43**
QUE2	Queen St	Y	**47**	**46**
QUE3	Queen St	Y	**56**	**55**
QUE4	Queen St	Y	**49**	**44**
STA1	Stafford Rd	Y	34	33
STA3	Stafford Rd	Y	34	33
STA4	Stafford Rd	Y	29	29
STA5[1]	Stafford Rd	Y	38	37
STA8	Stafford Rd	Y	30	29
STA9	Stafford Rd	Y	38	36
TEM1	Temple St	Y	34	34
TEM2	Temple St	Y	30	30
TEM3	Temple St	Y	32	32
WIL1	Willenhall Rd	Y	27	26
WIL2	Willenhall Rd	Y	**43**	**42**
WIL3[1, 2]	Willenhall Rd	Y	37	37
BIR	Birmingham Rd	Y	**43**	**41**
BRI	Bridgnorth Rd	Y	30	27
BRO	Broad St	Y	**48**	**47**
CAN	Cannock Rd	Y	33	31
CLE	Cleveland St	Y	36	36
CUL	Culwick St	Y	29	29
DUD	Dudley Rd	Y	30	30
NEA	Neachells Lane	Y	27	26
ROC	Old Hill, Tettenhall	Y	**42**	40
TRI	Trinity St	Y	30	30
WAT	Waterloo Rd	Y	40	37
WOL	5 Wolsley Rd	Y	28	26
PRO	Prosser St	Y	28	27
SPS	St Peter's Sq	Y	29	28
COL	Coleman Ave	Y	20	20
MAR	Marsh Lane	Y	18	17
WAR	Warstones Rd	Y	18	17
WRE	W'ton Rd East	Y	20	20

1 Mean of triplicate tubes
2 New site activated March 2009

Table 2.4b Results of Nitrogen Dioxide Diffusion Tubes: ISA, roadside, intermediate and background sites

Location	Within AQMA?	Annual mean concentrations (µg/m^3). Corrected for bias and distance to receptor		
		2008	2009	2010
Broad St	Y	**51**	**49**	**47**
Lichfield St, Bilston	Y	40	40	39
Lichfield St, Wolverhampton, East	Y	**56**	**55**	40
Lichfield St, Wolverhampton, West	Y	**46**	**46**	**41**
Princess St/Stafford St	Y	**44**	**45**	**43**
Queen St	Y	39	**42**	**47**
Stafford Rd	Y	33	34	33
Willenhall Rd	Y	**42**	39	35
Pipers Row	Y	**45**	**46**	**42**
Temple St	Y	33	33	32
Roadside sites	Y	35	35	33
Intermediate sites	Y	28	29	28
Background sites	Y	17	18	19

2.2.2 PM10

Tables 2.5a and 2.5b present a summary of TEOM data from the automatic monitoring stations for 2008, 2009 and 2010. This data has been corrected using the King's College volatile correction model (VCM) as required by technical guidance document LAQM.TG(09). The VCM was not available prior to 2008, therefore pre 2008 data has been corrected by applying the 1.3 correction factor to the annual mean in accordance with the previous guidance in LAQM.TG(03).

Table 2.5a Results of PM10 Automatic Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2010 %	Annual mean concentrations (µg/m^3)		
				2008	2009	2010
A1	Lichfield Street	Y	100	27	29	21
A2	Penn Road	Y	100	24	22	23
A3	Pendeford High School	Y	100	16	16	16
A4	Stafford Road	Y	100	20	21	22
A5	Willenhall Road	Y	94	19	20	21

There have been no exceedences of the PM_{10} annual mean objective during 2008, 2009 or 2010.

Table 2.5b Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2010 %	Number of Exceedences of hourly mean (50 µg/m^3) *If data capture < 90%, include the 90th %ile of hourly means in brackets.*		
				2008	2009	2010
A1	Lichfield Street	Y	100	26	**40**	**2**
A2	Penn Road	Y	100	10	6	0
A3	Pendeford High School	Y	100	7	2	0
A4	Stafford Road	Y	100	8	7	0
A5	Willenhall Road	Y	94	2	5	0

There were no exceedences of the 24-hr mean objective during 2008. The number of exceedences increased in 2009 at Lichfield Street due to building works being undertaken close to the monitoring site. However due to the closure of Lichfield Street to bus traffic in 2010 the number of exceedences has dropped significantly.

2.2.3 Sulphur dioxide

There have been no exceedences of the 15 minute, 1 hour or 24 hour objectives during 2008, 2009 or 2010.

Table 2.6 Results of SO_2 Automatic Monitoring: Comparison with Objectives

Site ID	Location	Within AQMA?	Data Capture 2010 %	Number of Exceedences of: (µg/m^3)		
				15-minute Objective (266 µg/m^3)	1-hour Objective (350 µg/m^3)	24-hour Objective (125 µg/m^3)
A4	Stafford Road	Y	99	0	0	0
A5	Willenhall Road	Y	98	0	0	0

2.2.4 Benzene

There are no significant sources of benzene in the city therefore the Council does not consider it necessary to monitor for this pollutant.

2.2.5 Other pollutants monitored

Since the previous Updating and Screening Assessment the Department of Environment and Rural Affairs (Defra) closed the Wolverhampton Central automatic monitoring station in October 2007. This monitoring station was located in St Peter's Square Wolverhampton and monitored oxides of nitrogen, sulphur dioxide, PM10 particles, carbon monoxide and ozone. Historical data from this site can be obtained on the Government's air quality web site: www.**airquality**.co.uk.

Since the closure of this site, the levels of carbon monoxide and ozone are no longer monitored in Wolverhampton. As the levels of these pollutants were below the objectives the Council does not intend to continue monitoring for these pollutants.

2.2.6 Summary of Compliance with AQS Objectives

Wolverhampton City Council has examined the results from the air monitoring sites in the city. The concentration of nitrogen dioxide is exceeding the annual mean objective at the following relevant locations within the declared AQMA:

Road side ISA's:

- Pipers Row
- Princess Street
- Queen Street

Roadside point locations:

- Broad Street
- Birmingham Road
- Old Hill, Tettenhall
- Penn Road/Goldthorne Hill Junction
- Willenhall Road/Neachells Lane junction

As the whole of the city has been declared an AQMA based on previous exceedences, it is not necessary to proceed to a detailed assessment at these locations.

3 New Local Developments

3.1 Road Traffic Sources

Wolverhampton City Council confirms that there are no new or newly identified roads which may have an impact on air quality within the Local Authority area.

3.2 Other Transport Sources

Wolverhampton City Council confirms that there are no new or newly identified other transport sources which may have an impact on air quality within the Local Authority area.

3.3 Industrial Sources

Wolverhampton City Council confirms that there are no new or newly identified industrial sources which may have an impact on air quality within the Local Authority area.

3.4 Commercial and Domestic Sources

Wolverhampton City Council confirms that there are no new or newly identified commercial and domestic sources which may have an impact on air quality within the Local Authority area.

3.5 New Developments with Fugitive or Uncontrolled Sources

Wolverhampton City Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

4 Planning Applications

The council did not receive any planning applications during 2010 for which an air quality assessment was submitted or requested.

5 Air Quality Planning Policies

5.1 The Unitary Development Plan (2006)

Policy EP3 of the UDP specifically relates to the National Air Quality Strategy. This will ensure that planning policy works with the air quality management process and will not hinder the Council in working towards achieving the air quality objectives. The specific section and policy on air quality from the UDP is reproduced below.

"5.4 Air Pollution

Policy EP3: Air Pollution

Development which is likely to hinder the achievement of the Council's air quality objectives will not be permitted unless such effects are mitigated to the satisfaction of the Council, through the use of planning obligations and conditions, where appropriate.

Development proposals which may affect an Air Quality Management Area should clearly demonstrate how they will contribute towards the achievement of air quality objectives for that area.

5.4.1 Air pollution can be damaging to human health and well-being, wildlife and the fabric of buildings and has knock-on effects on soil and water quality. Certain types of air pollution also contribute towards global warming, which is causing major changes in climate around the world. Emissions from road transport and industry are the major causes of air pollution in Wolverhampton. Emissions from some industries are controlled by the Council and the Environment Agency through environmental protection legislation.

5.4.2 The 2000 National Air Quality Strategy sets out Government's objectives for concentrations of a wide range of pollutants, below which there are no significant risks to human health. The Strategy sets target dates for achievement of these objectives, depending on the pollutant. In response, the Council has a duty to evaluate local air quality across Wolverhampton, predict pollutant levels against these targets and declare Air Quality Management Areas (AQMA's) in locations where the public will be exposed to air quality that is predicted to fall below national standards. For each AQMA identified, the Council must produce an Action Plan to bring air quality up to acceptable standards. The Council's first review and assessment of air quality was completed in 2000 and concluded that air quality objectives for some pollutants are being met and that others would be met by 2005. However, the Government has proposed a number of changes that may have an impact on whether the Council will need to declare AQMA's, notably changes to targets for particles and changes to vehicle emission factors.

5.4.3 Land use planning has an important role to play in the Council's strategy to achieve air quality objectives. Developments can produce air pollutants either by direct emissions e.g. by certain industrial processes, during construction / demolition, or indirectly, via changes in traffic flows. The Council will seek to ensure that new development does not result in a significant increase in production of air pollutants and that opportunities are taken to improve air quality, where possible. The impact of air pollutants is material to the consideration of planning applications. A detailed air quality assessment should be produced where a proposed development may have a significant adverse effect on air quality, particularly if an AQMA will be affected. This consideration will take into account the results of any Transport Assessment required under Policy AM1. In some cases, an Environmental Impact Assessment may be required (see Policy EP2). Lower concentrations of air pollutants, which do not prejudice air quality objectives but may nevertheless have an adverse affect on people's quality of life and the environment, should also be appropriately mitigated (see EP1).

5.4.4 In some cases, impacts on air quality can be successfully mitigated through measures such as Green Travel Plans (see Policy AM2), contributions to improve public transport and separating polluting uses from residential areas. A key objective of the UDP is to guide development to locations which will minimise the number of car journeys generated, and this is reflected in policies throughout the Plan. Areas of woodland also play an important role by absorbing air pollutants (see Policy N7).

Further guidance is provided in "Air Quality and Land Use Planning" (DETR, 1997) and "Air Quality and Land Use Planning - Good Practice Guide" (ARUP & RTPI, 1999)."

5.2 The Black Country Joint Core Strategy

The Joint Core Strategy which is to be adopted in April 2011 has been developed in conjunction with Dudley, Sandwell, and Walsall Councils'. It is a spatial planning document that will set out the vision, objectives and detailed spatial strategy for future development in The Black Country up to 2026. The document does not just consider land use, but also a comprehensive range of environmental, economic and social issues. The specific policy relating to air quality is reproduced below.

*"**ENV8: Air Quality***

Spatial Objectives

Promoting healthy living is a key element of the Sustainable Communities direction of change which underpins the Vision. Reducing exposure to poor air quality will improve the health and quality of life of the population, and support Spatial Objectives 3, 6, 7 and 8.

Policy

New residential or other sensitive development, such as schools, hospitals and care facilities, should, wherever possible, be located where air quality meets national air quality objectives. Where development is proposed in areas where air quality does not meet (or is unlikely to meet) air quality objectives or where significant air quality impacts are likely to be generated by the development, an appropriate air quality assessment will be required. The assessment must take into account any potential cumulative impacts as a result of known proposals in the vicinity of the proposed development site, and should consider pollutant emissions generated by the development.

If an assessment which is acceptable to the local authority indicates that a proposal will result in exposure to pollutant concentrations that exceed national air quality objectives, adequate and satisfactory mitigation measures which are capable of implementation must be secured before planning permission is granted.

Should permission be granted, as a departure from this policy, this will be conditional upon contributions being secured towards the cost of air quality action planning, to compensate for the additional burden placed on local authority air quality management regimes.

Justification

6.3 The Rogers Review (2007) recommended six national enforcement priorities for local authority regulatory services, one of which is air quality. Within the review it is stated that: "Air quality is a high national political priority and action taken to improve it will also contribute to tackling climate change. Local authorities have a vital role to play in delivering better outcomes. Air quality is a national enforcement priority because it impacts on whole populations, particularly the elderly and those more susceptible to air pollution and its transboundary nature means that local action contributes to national outcomes." The planning system has a key role to play in limiting exposure to poor air quality.

6.38 All the Black Country local authorities have declared their areas as air quality management areas to address the government's national air quality objectives which have been set in order to provide protection for human health. The main cause of poor air quality in the Black Country is traffic and there are a number of air quality hotspots where on-going monitoring is required. The Black Country local authorities are working to reduce pollutant concentrations and to minimise exposure to air quality that does not meet with national objectives.

6.39 For some developments a basic screening assessment of air quality is all that will be required, whereas for other developments a full air quality assessment will need to be carried out, using

advanced dispersion modelling software. An appropriate methodology should be agreed with the relevant Environmental Health / Environmental Protection Officer on a case by case basis.

6.40 Where a problem is identified mitigation measures might include:

- Increasing the distance between the development façade and the pollution source;
- Using ventilation systems to draw cleaner air into a property;
- Improving public transport access to a development;
- Implementing a travel plan to reduce the number of trips generated;
- Implementing Low Emission Strategies.

Primary Evidence

Annual Progress Report on Air Quality (2008)
Detailed Assessment of Air Quality (2004) and Annual Progress Report (2008) for each of the Black Country local authorities.

Delivery:

Development Management process.

Monitoring
Indicator Target

LOI ENV8 - Proportion of planning permissions granted in accordance with Air Quality Section's recommendations 100%"

6 Local Transport Plans and Strategies

6.1 West Midlands Local Transport Plan 2

The West Midlands Local Transport Plan 2 (LTP2) was published in 2006 and covers the period up to 31st March 2011. It sets out the West Midlands vision for the conurbation, central to which is the provision of an effective transport network.

The LTP2 identifies air quality as an important issue and sets out an air quality strategy which involves:

- working with the Highways Agency to deal with the substantial emissions from motorway traffic
- detailed initiatives to tackle local hotspots through engineering and traffic management
- broader policies to encourage forms of transport that have less impact on air quality, such as alternative-fuel vehicles

The LTP2 target for air quality is to reduce the average NO2 level by 1% between 2004/05 and 2010/11 in areas where NO2 exceeds the national objective. This is ambitious, given rising traffic levels, but can be achieved if congestion and traffic growth targets are met.

6.2 West Midlands Local Transport Plan 3

The West Midlands Metropolitan Area Local Transport Plan (LTP3) will be a statutory document setting out the transport strategy and policies for the Metropolitan Area to 2026. LTP3 will supersede the current LTP2, which expires on 31 March 2011.

A key objective of the LTP3 vision will be air quality and climate change.

6.3 The Black Country Joint Core Strategy

The Joint Core Strategy recognises the key role which the transport network plays in maintaining the economic well being of the region. The strategy contains specific policies for providing an efficient and reliable transport network which link with the LTP, these are reproduced below.

"CSP5 Transport Strategy

Strategic Objectives

From the outset of the Black Country Study it has been acknowledged that transport has a key role in providing a catalyst for the urban renaissance of the Black Country, to support national economic competitiveness and growth by delivering reliable and efficient transport networks. Improved access to key destinations is vital to achieve the required step change in the quality and extent of the areas' transport network to reverse the outward migration of population and to support economic and social aspirations. It is important that this network provides rapid, convenient and sustainable links between the Strategic Centres, housing growth areas, employment areas, local communities and the regional and national transport networks.

The Core Strategy sets the agenda for the transformation of the Black Country transportation network. It identifies the key factors required to enhance the transport infrastructure and assist delivery of the Spatial Objectives for the area:

- *Improved accessibility and connectivity of an integrated public transport network.*
- *Improved road network and links to the national M5 and M6 motorway network.*
- *Improved access to the freight railway network.*
- *Improved walking and cycling provision.*

The overall transport strategy supports all of the Spatial Objectives, particularly 7.

Policy

The large-scale land use changes proposed in the Core Strategy require an effective and integrated transport network which will serve existing and new developments and promote greater use of sustainable transport modes, helping to reduce the growth in car borne journeys. This transport strategy for the Black Country is intended to reflect the following strategic outcomes:

- ***Enabling the expansion of the Strategic Centres;***
- ***Providing communities with improved access to employment, residential services and other facilities and amenities, with travel choices that are attractive, viable and sustainable;***
- ***Improving air quality and helping to address negative impacts on climate change;***
- ***Improving the accessibility of employment sites to residential areas and providing reliable access for freight to the national motorway network;***
- ***Facilitating access to quality employment land;***
- ***Containing congestion by developing and managing transport networks to operate more efficiently;***
- ***Improve road safety;***
- ***Supporting the strategy through demand management and the promotion of sustainable transport;***
- ***Improve access to information relating to travel options for visitors, businesses and local people.***

Justification

2.24 The transport objectives for the Core Strategy reflect:

- *National transport guidance and the West Midlands Local Transport Plan 2;*
- *Regional Spatial Strategy for the West Midlands January 2008;*
- *West Midlands Regional Spatial Strategy Phase 1 Revision - Black Country Study*
- *The Vision and Spatial Objectives for Black Country;*
- *Existing and future transport challenges*
- *The Black Country Investment Plan*

2.25 In particular, they are consistent with the government's DaSTS goals for transport which are summarised as follows:

- *Support economic growth;*
- *Tackle climate change;*
- *Contribute to better safety, security and health;*
- *Promote equality of opportunity; and*
- *Improve quality of life.*

2.26 The transport objectives for the Black Country have guided the formation of the transport strategy. They are intended to deliver specific outcomes, and will be supported by indicators and targets that will be incorporated into a monitoring and review mechanism that will measure the extent to which transport objectives are being delivered. This will be undertaken by the authorities, through joint working, and particularly in conjunction with the Local Transport Plan process covering the West Midlands Metropolitan area as a whole.

2.27 The technical work undertaken by PRISM modelling has demonstrated that the various multimodal networks continue to function during the plan period and that the planned interventions deliver improvements to their performance. An emphasis on "Smarter Choices" and the recognition of the benefits to be secured by embracing and promoting the advantages of new technologies, such as broadband, video conferencing and internet shopping, assists in achieving this outcome. Against this background it is acknowledged that some hotspots will exist and that they will be mitigated through the Transport Assessment process as development comes forward.

2.28 The strategic outcomes within the transport strategy will be achieved by implementing the following measures:

- *Development and promotion of high quality, reliable public transport (including rapid*
- *transit), improving connectivity between residential and employment land.*
- *Promotion of sustainable, viable modes of travel (public transport, walking and cycling) to support reducing congestion, improving air quality and addressing climate change.*
- *Improving strategic traffic management (active traffic management and hard shoulder*
- *running on motorways) and the strategic highway network (junction improvements at key*
- *transition points on the network and urban traffic control) to relieve congestion and improve accessibility.*
- *Improving road safety through auditing of proposals and promotion of road safety*
- *education.*
- *Creating a secure environment.*

2.29 These outcomes for transport underpin the overall focus on regeneration and job creation in the Black Country. The regeneration of the Black Country will make a very significant contribution to improving equality of opportunity in the Region as incomes are currently well below the regional average. Planning land use and transport in an integrated way was a key theme of the Black Country Study with the aim of locating employment, retail and new housing in the locations most accessible by sustainable means of travel, particularly the strategic centres. The pattern of land use proposed in the Core Strategy will be the most sustainable possible by maximising use of new and improved public transport facilities and services. Increased public transport usage, and overall modal share for sustainable transport modes will support additional improvements to the public transport network, further strengthening the accessibility of the Strategic Centres.

2.30 The transport strategy and policies in the Core Strategy reflect the approach in the West Midlands Local Transport Plan 2006-20011 (LTP2), and whilst the LTP covers a much shorter period than the Core Strategy, the underlying principles and its shared vision will remain valid over the longer period. The shared vision is for:

i. a thriving sustainable and vibrant community where people want to live and where business can develop and grow
ii. city, town and local centres that are attractive and vibrant, where high quality public transport is the norm and walking and cycling are common-place
iii. cleaner air and less congested traffic conditions
iv. a safer community with fewer road accidents and with environments in which people feel secure
v. equal opportunities for everyone to gain access to services and facilities and enjoy a better quality of life, with travel choices that are attractive, viable and sustainable.

2.31 It is anticipated that the new Local Transport Plan for the West Midlands (LTP3) which is currently being developed for submission in December 2010 will continue to be based on these enduring principles, with schemes and interventions being considered in terms of their impact and effectiveness.

2.32 Improving the environment and quality of life in the Black Country are considered essential in making the area an attractive place to live. The overall transport strategy proposed for the Black Country is to upgrade public transport and promote "Smarter Choices" initiatives while maximising the capacity of the highway network through strategic traffic management initiatives while improving capacity and operation at key junctions. Transport Assessments and Travel Plans will help to fund some infrastructure.

2.33 The Highways Agency plans for Active Traffic Management and hard shoulder running on the M6 integrate well with this approach. The RSS Phase 1 revision has confirmed the need to improve Junctions 1 and 2 of the M5 and Junctions 9 and 10 on the M6 in the longer term. The nature of these improvements and their timing will be dependent on further studies that include the DaSTS Access to Birmingham study, investigation of the impacts of strategic development proposals and associated

Area Action Plans and future Regional Funding Allocations considerations. Uncommitted transport infrastructure will be subject to detailed investment appraisal and funding opportunity.

2.34 New highway construction, as opposed to improving existing routes, will generally be limited to schemes supporting regeneration by allowing new development to take place or enhancing access from development areas to the principal highway network, particularly in the foci for Advantage West Midlands investment.

2.35 A Black Country long distance walking and cycling network has been identified and will be integrated with plans for Environmental Infrastructure. The land use pattern and transport networks set out in the Core Strategy will encourage healthy and active lifestyles.

2.36 The Core Strategy land use and development proposals were tested using the PRISM land use and transport model, which demonstrated a reduction in the amount of road traffic generated compared to other options tested.

2.37 The Transport Strategy is aimed at managing down and then accommodating the residual traffic demand generated by increases in car ownership, population and the transformational regeneration of the strategic centres. The strategy relies on attracting development to these four centres and this will require the careful phasing of parking supply to allow the management of demand to be adjusted to the availability of better quality public transport.

Primary Evidence

The transport policies respond to the transport objectives and outcomes referred to above and are founded on a robust evidence base derived from transport modelling undertaken as part of the Black Country Study, the Regional Spatial Strategy Phase 2 review of housing proposals and a transport strategy review of the Black Country. These studies have included investigation of a number of land use and transport scenarios for the wider Black Country and West Midlands area. The development of the transport strategy has also been informed by a number of local transport studies, preparation of transport Major Scheme Business Cases and on-going monitoring of transport trends and performance of the transport networks in the area in conjunction with the West Midland Local Transport Plan.

The Black Country Study 2006
Review of Transport Strategy 2009 – Mott MacDonald
PRISM Model testing the Black Country Strategy – 2006
PRISM Black Country Core Strategy Transport Technical Document – July 2009
West Midlands TiF Study
Major Scheme Business Cases:

- *West Midlands Red Routes Package 1*
- *West Midlands Urban Traffic control*
- *A41 Expressway*

CSP5 will be delivered and monitored through arrangements set out within the Transport Policies of the Core Strategy. "

TRAN2: Managing Transport Impacts of New Development

Spatial Objectives

In order to ensure that the transport elements of the Spatial Strategy are deliverable it is essential that new developments and existing facilities demonstrate their travel and transportation impacts together with proposals for mitigation. It is important that accessibility by a choice of sustainable modes of transport is maximised at all developments. Transport Assessments and Travel Plans, produced by developers, employers, schools and facility operators, are essential to bring about sustainable travel solutions and help deliver Spatial Objective 7.

Policy

Planning permission will not be granted for development proposals that are likely to have significant transport implications unless applications are accompanied by proposals to provide an acceptable level of accessibility and safety by all modes of transport to and from all parts of a development including, in particular, access by walking, cycling, public transport

and car sharing. These proposals should be in accordance with an agreed Transport Assessment, where required, and include implementation of measures to promote and improve such sustainable transport facilities through agreed Travel Plans and similar measures.

Justification

5.14 All developments will be assessed both in terms of their impact on the transport network and the opportunities that could be available to ensure that the site is accessible by sustainable modes of transport. The supporting documentation will either take the form of a full Transport Assessment (TA) or a less detailed Transport Statement (TS) and will generally be determined by the size and scale of development or land use. This will be based on Appendix B of the DfT Guidance on Transport Assessment, although a TA may be required instead of a TS for a range of other reasons (for example road safety concerns, existing congestion problems, air quality problems, concerns over community severance or likelihood of off-site parking being generated).

5.16 Depending on the size, nature and location of the development the TA will need to make recommendations for a range of Travel Plan (TP) measures that are capable of achieving either significantly lower than average traffic levels or reduced levels of car use. A Travel Plan is a long term management strategy for an occupier or site that seeks to deliver sustainable transport objectives through positive action and is set out in a document that is regularly reviewed and up-dated. Travel Plans will normally be secured as planning obligations and/or planning conditions along with any remedial transport measures required due to the potential impact of the development.

5.17 The scope of the Travel Plan will be determined by the size, scale and nature of the development, the findings of the Travel Assessment or Statement and through pre-application discussions.

Primary Evidence

The Preparation of Transport Assessments and Travel Plans, Sandwell MBC (October 2006)

Delivery

Through the Development Management process and via Planning Obligations or other legal and funding mechanisms.
Set out in appropriate Supplementary Planning Guidance.

Monitoring
Indicator Target

LOI TRAN2 - Appropriate provision or contributions towards transport works and Travel Plans measures by all relevant permissions.
Travel Plans to be produced for 100% of all planning applications that are required to submit a Transport Assessment or a Transport Statement."

6.4 Help2Travel

The Help2Travel website provides travel information to the public and has been developed as part of a European project for intelligent transport information systems. It provides users with a comprehensive overview of traffic & travel in the West Midlands region. It includes information about roadwork's and incidents on the region's roads, real-time train and bus information, as well as information & links to car parking, cycling and air quality information.

The system also enables up to the minute travel information to be exchanged easily between transport authorities, allowing them to respond more quickly and efficiently to travel problems.

6.5 Wolverhampton TravelWise

TravelWise is a national campaign to promote and encourage sustainable and healthy travel choices, rather than relying on the car for all journeys.

TravelWise helps people to consider what options other than the car might be available to them, particularly for shorter journeys.

The West Midlands TravelWise Group and Wolverhampton TravelWise work closely with Local Authorities in the Region, the West Midlands Passenger Transport Executive, Centro and Public Transport Operators to improve conditions for people who walk, cycle and use public transport. Centro and Travel West Midlands are also key partners in Company TravelWise and offer discounts to the employees of those organisations that sign up to the scheme.

6.6 Wolverhampton Cycling Strategy

The Council adopted the current Cycling Strategy in 1995 and has made good progress in implementing its proposals. The Government published 'The National Cycling Strategy' in 1996 and the Cycling Strategy for the West Midlands set out in the Local Transport Plan. This provides a framework to identify specific problems encountered by cyclists and provides some of the solutions to address these.

6.7 Wolverhampton Walking Strategy

The walking strategy aims to encourage walking by recognising its role as a mode of transport and acknowledging that walking forms part of the solution to tackling traffic congestion.

The Strategy provides a framework for the Council to identify specific problems encountered by pedestrians and factors that deter walking in Wolverhampton and seeks to provide some of the solutions to address these. Many of the solutions are ones of information and maintenance and do not require very technical or major infrastructure solutions.

7 Climate Change Strategies

7.1 Wolverhampton Declaration on Climate Change

In December 2006 the Council signed the Wolverhampton Declaration on Climate change which commits the Council to work to address both the causes and impacts of a changing climate in all its work.

7.2 Climate Change Strategy and Action Plan

The Climate Change Strategy and Action Plan for Wolverhampton 2009-2012 has been developed in fulfilment of the Wolverhampton Declaration on Climate Change.

The Strategy addresses climate change through mitigation (reducing our CO2 emissions) and adaptation to future climate change.

Through the Climate Change Strategy and Action Plan the Council will strive to secure a sustainable quality of life in the long term for everyone associated with the city.

7.3 The Unitary Development Plan (2006)

The UDP includes policies that recognise the importance of ensuring that future development will create sustainable communities. This will be achieved by adherence to existing UDP policies on protecting the environment, controlling pollution, encouraging renewable energy, provision of adequate and convenient community facilities, and the provision of a high quality public transport system. The specific section and policies which relate to climate change are reproduced below.

"5.11 Energy

Policy EP16: Energy Conservation (Part I)

The conservation and efficient use of energy will be maximised by:

- ***Ensuring that the energy demands of developments are minimised through appropriate location, orientation, siting and design;***
- ***Encouraging the production and use of renewable energy.***

5.11.1 PPG22 Renewable Energy (1993) requires local planning authorities to consider the contribution their area can make towards energy conservation, given that current use of fossil fuels is unsustainable, in economic and environmental terms. Transport is a major consumer of fossil fuel resources and UDP policies which guide development to locations where the need to travel is minimised will make a large contribution towards energy conservation.

5.11.2 Buildings generate large demands for energy over their lifespan. Building Regulations ensure that detailed measures for energy conservation, such as insulation, are included in the construction of new buildings. The planning system can also help by promoting energy saving features in the design of developments e.g. orientating buildings so they retain maximum heat from the sun (passive solar gain) and are sheltered from wind chill effects. Design features which improve water efficiency and encourage recycling of waste are also energy efficient. See also Policy D13: Sustainable Development.

Policy EP17: Renewable Energy

Favourable consideration will be given to developments that produce or use renewable energy, where such proposals conform with other Plan policies and are in scale and character with their surroundings.

Where a new development will generate significant energy demands, consideration should be given to the provision of combined heat and power systems and district heating schemes to serve the development. Renewable energy facilities which are of a large size or likely to have a significant impact on the environment should be located within industrial areas.

5.11.3 Another way of conserving energy resources is through encouraging greater use of renewable sources of energy, such as solar, wind and water power or waste incineration. Other renewable sources of energy include wood from local, sustainably-managed woodlands and controlled use of landfill gas, which can supplement gas supplies, generate heat and electricity and also remove the risk of fires and explosions. The Crown Street Energy from Waste facility is a major source of renewable energy in Wolverhampton, generating 7 megawatts of energy each year, sufficient power for 12,000 households. If proposals come forward for further renewable energy facilities, these will be considered favourably, providing they conform with other Plan policies and are located appropriately. An Environmental Impact Assessment may be required for such facilities (see Policy EP2).

5.11.4 The inclusion of appropriate renewable energy features in the design of new development, such as solar panels on buildings or combined heat and power (CHP) facilities, which make use of waste heat e.g. from industrial processes, will also be encouraged. These features allow developments to harness renewable energy for use on site, to the extent that some developments can be self-sufficient or even net producers of energy. This also helps to reduce the large amount of energy wasted during transfer across the national grid. All renewable energy facilities should be carefully located and designed to ensure that no harm is caused to the environment or to the health and well-being of occupants of the site or the surrounding area. "

7.4 The Black Country Joint Core Strategy

The Core Strategy identifies the main ways in which activity in The Black Country contributes towards climate change, together with ways of reducing and adapting to it. The vision statement relating to sustainability and climate change is reproduced below.

"b. Sustainability Principles

2.3 The achievement of this vision requires a number of sustainability challenges to be addressed:

A. Facing up to Climate Change

Meeting the requirements of RSS Policy CC1: Climate Change by ensuring that the spatial approach to development both minimises climate change impacts and is 'climate change proofed' by mitigating and adapting to predicted changes in the climate of the Black Country.

B. Sustainable Development

Ensuring that development meets the social, economic and environmental needs of the present without compromising the ability of future generations to meet their own needs. This will include sustainable management of material resources through minimising waste, making prudent use of minerals, water and energy, using renewable and low-carbon technologies to produce what we need and 'putting the right thing in the right place' to strengthen centres and ensure easy access to facilities.

C. Social Inclusion

Ensuring all members of the community have the best possible access to facilities, housing and opportunities.

D. Brownfield First

Ensuring that previously developed land, particularly where vacant, derelict or underused, is prioritised for development over greenfield sites.

E. Comprehensive Approach to Development

Delivering complex and large-scale redevelopment in a way that ensures new development links well with surrounding areas, makes efficient use of land, improves amenity, avoids a piecemeal approach that could result in blight and constrain neighbouring uses, and provides infrastructure necessary to support individual developments in a co-ordinated way. Site Allocation Documents, Area Action Plans and other planning documents will be promoted as the preferred mechanism to achieve a comprehensive approach in areas of large-scale change.

2.4 The RSS policies and proposals for the Black Country are already grounded in these sustainability principles. The spatial strategy is highly sustainable, concentrating growth in the most accessible locations, within Strategic Centres and along public transport corridors. The vast majority of new housing will be built on brownfield land, concentrated close to existing public transport nodes to minimise climate change impacts. Significant new green infrastructure will be created within developments, which will help to mitigate the effects of climate change and make inner urban areas more attractive places to live. "

7.5 The West Midlands Regional Spatial Strategy (RSS, 2004),

This strategy provides a regional strategic context for local planning decisions, and has a responsibility to help meet national targets for the reduction of greenhouse gases. The Regional Planning Body is expected to consider how the region's activities contribute towards climate change, and how the region might be vulnerable to the impacts of climate change, in working with partners to develop a realistic and responsible approach to climate change in the region. This will require establishing comprehensive and up to date data in order to enable the local authorities and agencies to develop coordinated and effective solutions. Guiding principles were used in developing the Spatial Strategy to ensure that policies to assist the reduction of greenhouse gas emissions are an integral part of the West Midlands Regional Spatial Strategy.

7.6 The Wolverhampton Community Plan 2002-2012

The community plan states that partners "*will work to make sure that the actions of today do not reduce opportunities for future generations".* The aim is to create a sustainable city. As part of the creation of a Green City

In addition, the Community Plan Addendum priorities include effective energy-efficiency measures and measures to combat and adapt to climate change.

~~9~~8 Conclusions and Proposed Actions

~~9.1~~8.1 Conclusions from New Monitoring Data

Wolverhampton CC has carried out a comprehensive review of all monitoring data gathered since the previous Updating and Screening Assessment in 2010. Areas where the air quality objectives are not being met have been identified together with any significant trends.

Recent monitoring data has identified that air quality continued to improved across the city during 2010. This has resulted in a reduction in the number of areas within Wolverhampton which are exceeding the objectives. The Council has concluded that a detailed assessment will not be required.

~~9.1.1~~8.1.1 Nitrogen dioxide data

Data collected since the previous Updating and Screening assessment continues to confirm that the following relevant roads and junctions are exceeding the air quality objective for nitrogen dioxide:

Road side ISA's:

- Lichfield Street, Town Centre
- Pipers Row
- Princess Street

Roadside point locations:

- Broad Street
- Birmingham Road
- Old Hill, Tettenhall
- Penn Road/Goldthorne Hill Junction
- Stafford Road Vine Island
- Willenhall Road/Neachells Lane junction

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Trend Data

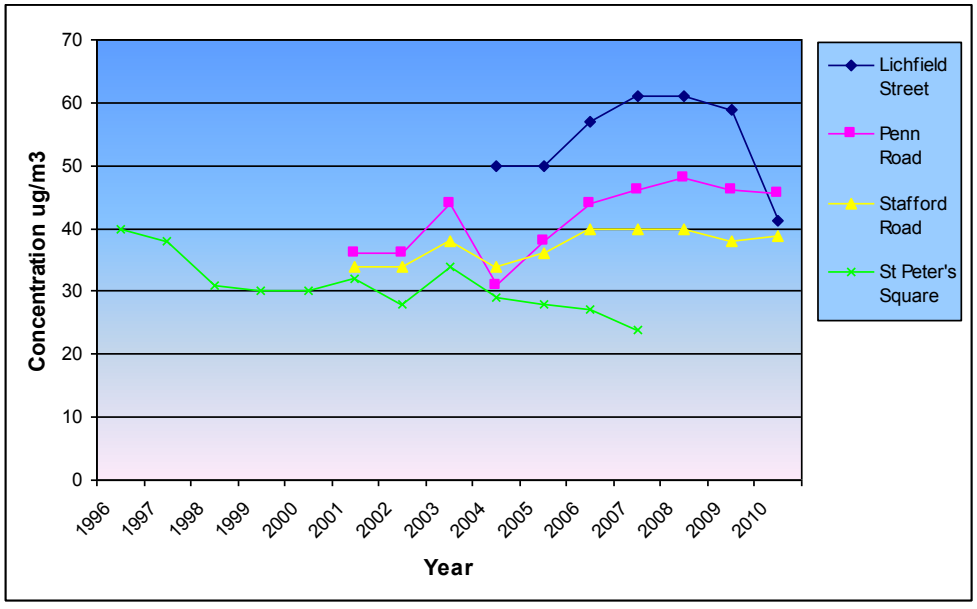
Average NO2 concentrations from the 4 longest running automatic monitoring stations are presented in Figure 10.1a.

The St Peter's Square station was located 30 metres from the ring road and was classified as an intermediate site. It operated from 1996 through to 2007 and the results show an overall reduction in NO2 concentrations over that period.

Penn Road and Stafford Road stations are both roadside sites and the results from them show that roadside levels of NO2 rose steadily between 2004 and 2008. Since 2008 there has been a reduction in NO2 concentrations at both these sites.

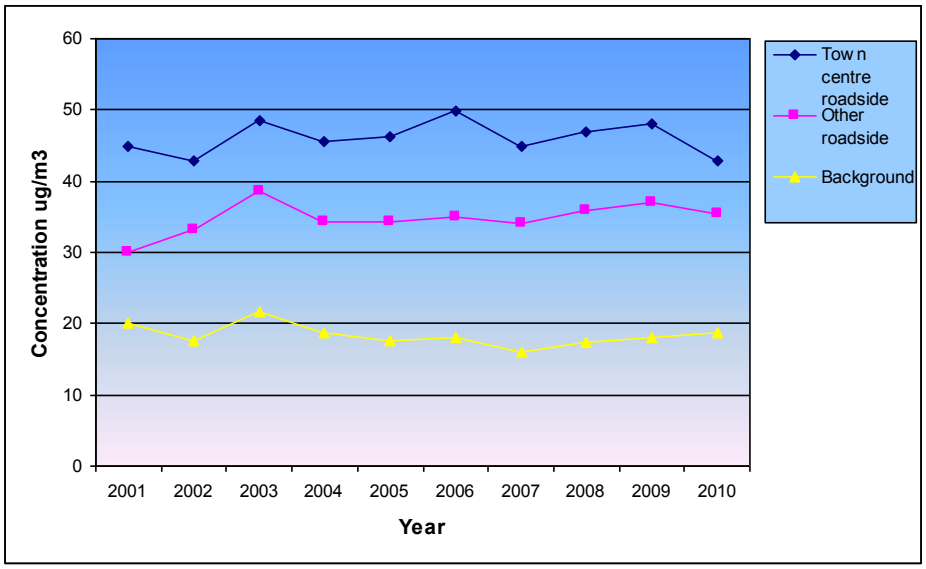
The Lichfield Street station is on one of the main access routes into the bus station. The levels of NO2 in Lichfield Street are considerably higher due to the numbers of buses travelling along the road. The overall trend between 2004 and 2009 is similar to the other roadside sites. However, in 2010 there was a large decrease in NO2 brought about by the closure of Lichfield Street as part of the bus station redevelopment project. This project is due be completed in summer 2011 when the road will be re-opened to bus traffic. It is expected that the numbers of buses using Lichfield Street when it re opens will be around half the previous number.

Figure 10.1a Annual mean concentrations of NO_2 (Automatic Stations).



The diffusion tube data presented in figure 10.1b below shows minor fluctuations in the annual mean concentrations year to year whilst the overall trend at roadside and background locations remains stable. The reduction in the town centre 2010 results reflects the closure of the bus station and access roads.

Figure 10.1b Annual mean concentrations of NO_2 (diffusion tubes).



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~~9.1.2~~8.1.2 PM_{10} data

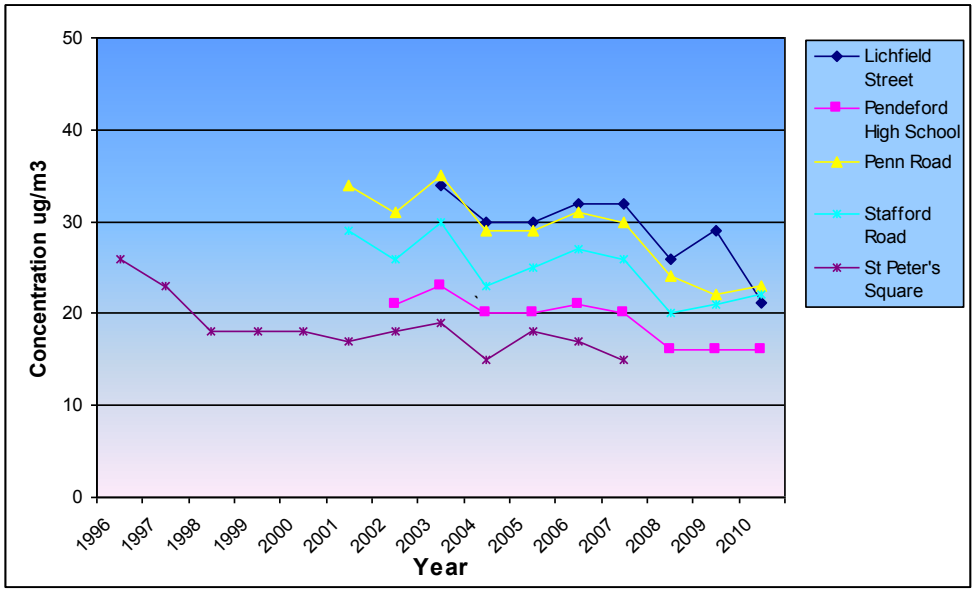
There were no exceedences of the PM_{10} objectives during 2010.

Trend Data

The data corrected using the VCM is significantly lower than the previous data which is reflected in the marked step change in the trend graphs for 2008.

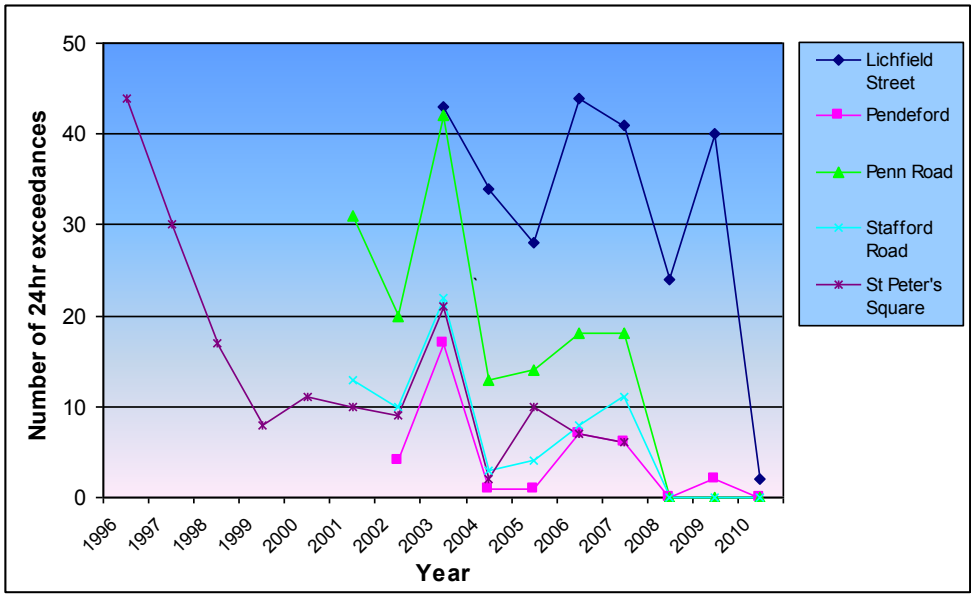
or to 2008 PM_{10} the results were indicating a down ward trend in annual mean PM10 concentrations. Following on from 2008 PM10 concentrations have been fairly stable at the Pendeford School, Penn Road and Stafford Road sites. The concentrations of PM10 at Lichfield Street since 2008 have been rather less stable. In 2009 there was a sharp increase due to construction works near to the monitor which was followed by an equally sharp decrease in 2010. The 2010 decrease was caused by the temporary closure of the bus station.

Figure 10.2a PM$_{10}$ annual mean concentrations



The yearly variations in the number of 24 hour exceedences (Fig 10.2b) are more pronounced however the overall trend is similar to the annual mean concentration. It is noticeable that there was a large increase in exceedences during 2003 due to adverse weather conditions which hampered dispersion.

Figure 10.2b PM$_{10}$ 24 hour exceedences



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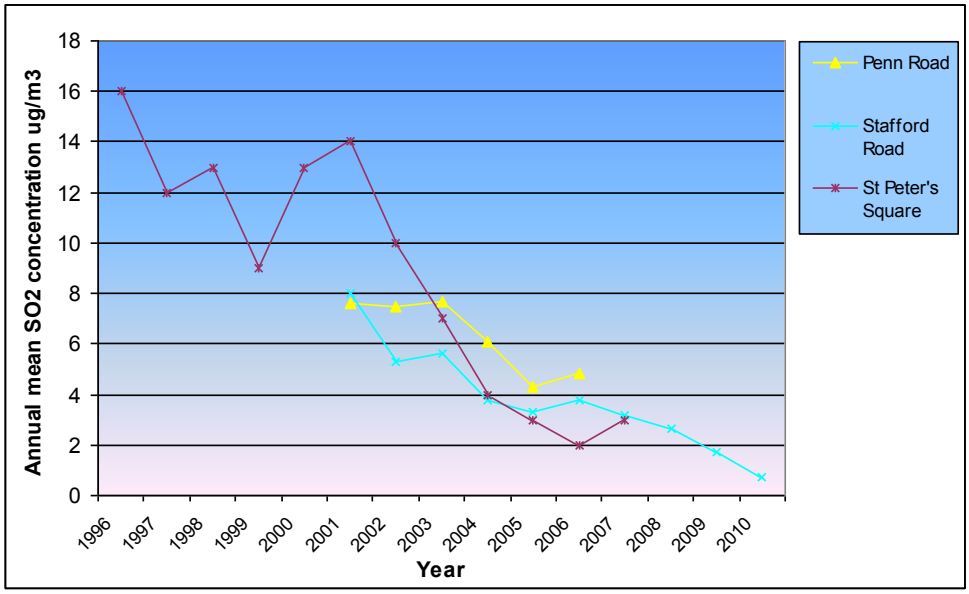
~~9.1.3~~8.1.3 SO2 data

The levels of sulphur dioxide have dropped significantly since the 1990's. The rate of decline has slowed over recent years however the annual mean concentrations of SO_2 are continuing to fall (Fig 10.3).

Figure 10.3 SO_2 annual mean concentrations



8.2 Conclusions relating to New Local Developments

The Progress Report has considered the likely impacts of local developments, road transport, other transport sources, industrial installations, commercial and domestic sources, and fugitive emissions.

The report has concluded that there are no new or significantly changed sources which require a Detailed Assessment.

8.3 Proposed Actions

The Progress Report has confirmed that there are no new locations exceeding the air quality objectives therefore a detailed assessment is not required.

The Progress Report has confirmed that there are a no new locations where additional monitoring is required. Sites which are showing continued compliance with the objectives will be considered for closure at the end of the current year.

Wolverhampton City Council intends to submit the 2012 Updating and Screening Assessment as required by the Review and Assessment process.

~~11~~9 References

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(1) Local Air Quality Management – Technical Guidance LAQM.TG(09), Department for Environment, Food and Rural Affairs 2009.

(2) Air Quality Review & Assessment Updating and Screening Assessment Incorporating Stage 4 Assessment and Action Plan Progress Report 2009. Wolverhampton City Council.

(3) Air Quality Review & Assessment Progress Report 2010 Wolverhampton City Council.

(4) LAQM Tools; Local Air Quality Management website www.airquality.co.uk.

Appendix A: QA/QC Data

Diffusion Tube Bias Adjustment Factors

Diffusion tubes are supplied and analysed by Gradko International Ltd. and are prepared using 50%TEA in acetone. The tubes arrive from Gradko and are stored in a refrigerator prior to being labelled with a site and date code. The tubes are then exposed in accordance with the start and end dates for the national NO_2 survey. Following exposure the tubes are capped and immediately dispatched to Gradko for analysis.

The bias adjustment factor for the tubes and supplier have been obtained from the LAQM tools website, Review & Assessment database, Spreadsheet Version Number: 05/09, these are detailed below.

Table A1.1 National bias adjustment factors

Year	Bias Adjustment Factor
2008	0.93
2009	0.97
2010	0.99

Factor from Local Co-location Studies

Triplicate tubes are exposed at the automatic monitoring stations in order to calculate a bias correction factor. The correction factor is applied to the yearly average to enable comparison with the annual NO_2 objective. The results from the co-location studies for 2009 are shown in the tables below.

The St Peter's Square site is the Wolverhampton Centre AURN station which was closed by Defra in October 2007. Since the closure of this site, co-location tubes have been placed at the Lichfield Street and Willenhall Road automatic stations. The factor applied to the data set is the mean bias adjustment factor from Table A1.2.

Table A1.2 Chemiluminescent v Diffusion Tube Values 2010 (µg/m^3)

Location	Bias	Ave	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Automatic Monitor Intercomparison: Diffusion Tube Values (µg/m^3)														
Lichfield Street		41	65	74	46	42	33	40	26	32	27	32	44	50
Lichfield Street		41	63	64	50	34	34	33	26	31	35	33	42	59
Lichfield Street		43	63	65	51	38	36	39	25	35	31	36	48	69
Stafford Road		38	49	48	37	33	34	35	39	31	39	33	41	55
Stafford Road		38	47	52	36	37	34	35	33	36	33	33	44	45
Stafford Road		38	50	47	42	34	33	37	35	33	36	38	45	47
Automatic Monitor Intercomparison: Monthly Chemiluminescent Values (µg/m^3)														
Lichfield Street		41	57	61	53	42	36	32	21	27	31	36	42	53
Stafford Road		39	50	50	40	40	36	32	27	29	32	34	42	52
Automatic Monitor Intercomparison: Averages of Triplicate Tubes (µg/m^3)														
Lichfield Street		42	64	68	49	38	34	37	26	33	31	34	45	59
Stafford Road		38	49	49	38	35	34	36	36	34	36	33	42	50
Automatic Monitor Intercomparison: Bias adjustment factor														
Lichfield Street	0.95		0.90	0.90	1.09	1.11	1.06	0.87	0.81	0.82	0.98	1.08	0.94	0.90
Stafford Road	0.99		1.02	1.01	1.04	1.16	1.08	0.91	0.75	0.85	0.91	1.04	0.99	1.03
Mean	**0.97**		0.96	0.95	1.07	1.13	1.07	0.89	0.78	0.84	0.95	1.06	0.97	0.97

Discussion of Choice of Factor to Use

A comparison of the relevant bias adjustment factors is shown in Table A1.3 below. It should be noted that the national factors have been calculated using data from a number of authorities, with tubes exposed at different types of locations which will have been prepared and analysed in different batches and at different times.

The local bias adjustment factors are derived from triplicate co-located tubes exposed alongside an automatic analyser. These tubes are from the same batch as the measurement tubes and are handled, stored and analysed in the same way.

Table A1.3 National and local bias adjustment factors.

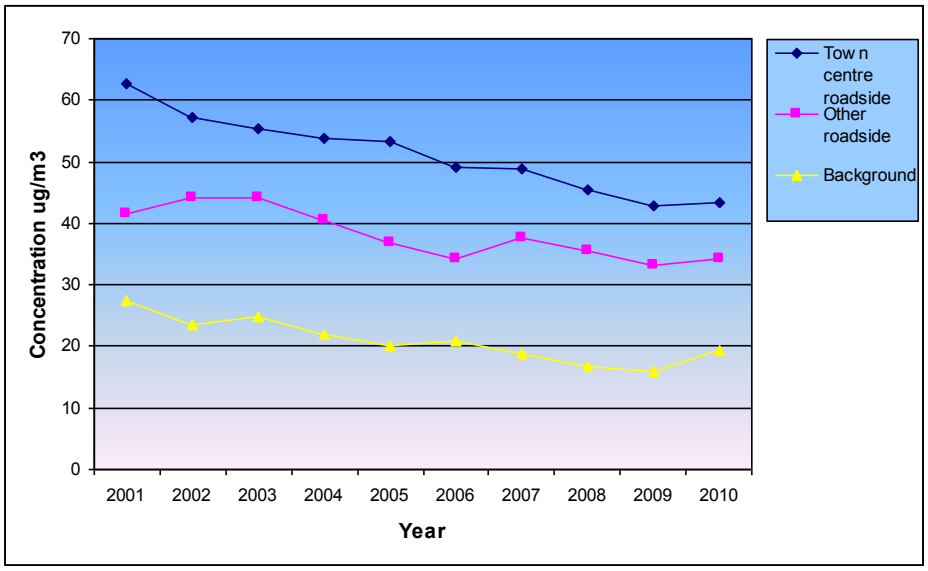
Year	National Bias Adjustment Factor	Local Bias Adjustment Factor
2001	1.45	1.01
2002	1.27	0.95
2003	1.11	0.97
2004	1.10	0.93
2005	1.10	1.00
2006	1.01	1.03
2007	0.99	0.93
2008	0.94	0.97
2009	0.97	1.08
2010	0.99	0.97
Mean	1.09	0.98
Std	0.16	0.05

The locally derived bias adjustment factors indicate that the tubes correlate well with the automatic analysers throughout the period (2001-2010). Generally the tubes over-read slightly, the mean over-read is 2%. The local data set shows a high degree of precision, the mean value is 0.98 and a standard deviation of 0.05, assuming a normal distribution.

The nationally derived bias adjustment factors prior to 2006 suggest that the tubes were significantly under reading, which is not our experience at Wolverhampton. This is particularly evident in 2001 and 2002 during which the tubes appeared to under read by 45% and 27% respectively. The mean value is 1.10 and a standard deviation of 0.16, assuming a normal distribution.

Trend data using both correction factors is presented in Figures A1.1 and A1.2. This shows that the national correction factor artificially raises the NO_2 concentrations at the start of the period, and produces an overall downward trend of between 10 and 20ug/m3 (Figure A1.1).

Figure A1.1 Annual mean NO_2 values using the national bias adjustment factor.



The diffusion tube NO_2 concentrations corrected with the locally derived adjustment factors (Figure A1.2) remained relatively stable over the period. These correction factors produce trend data which is more consistent with the data from the automatic analysers (Figure A1.3).

Figure A1.2 Annual mean NO_2 values using the local bias adjustment factor.

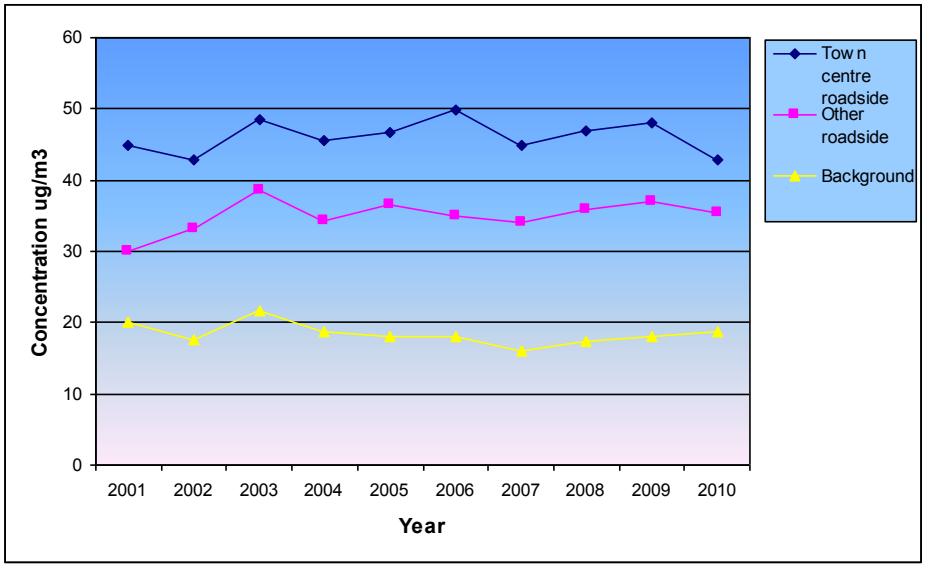
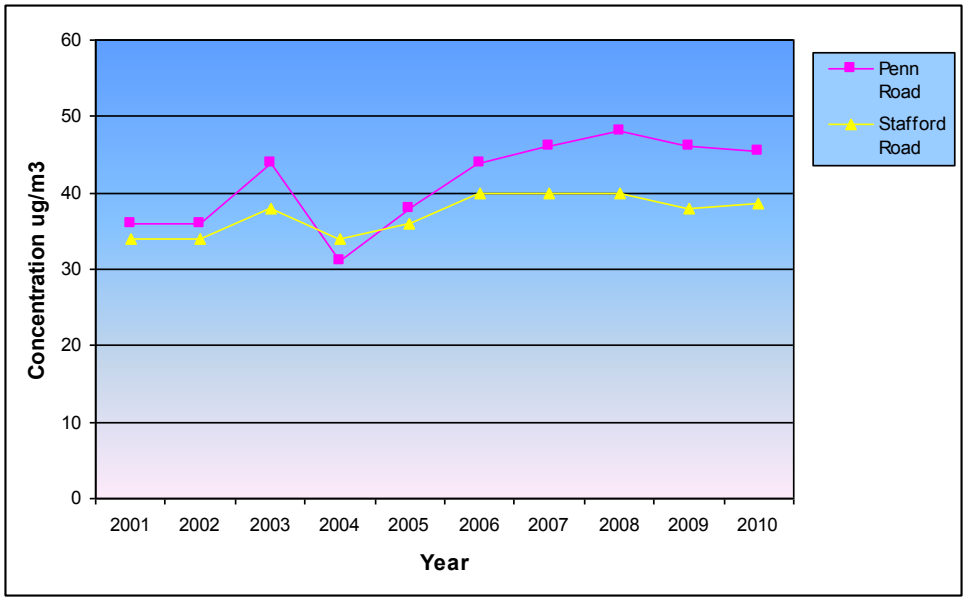


Figure A1.3 Annual mean NO_2 values automatic analysers.



The automatic trend data (Fig A1.3) shows a sharp increase in 2003 due to the exceptional weather conditions during that year. Overall NO_2 concentrations have increased since 2001 at roadside locations.

Similar trends are apparent in the diffusion tube data corrected using the local bias adjustment factor. Figure A1.2 clearly shows the increase in 2003, an overall increase at roadside locations, and a small decrease at background locations.

Based on the analysis of diffusion tube data, it is considered that the local bias adjustment factor better reflects the performance of diffusion tubes at a local level. The locally corrected data provides better resolution and a clearer picture of NO_2 fluctuations and trends.

PM Monitoring Adjustment

Particle monitoring is carried out using Tapered Element Oscillating Microbalance (TEOM) analysers. Data for 2008, 2009 and 2010 has been corrected using the volatile correction model (VCM) as required by LAQM.TG(09). The VCM was not available prior to 2008, therefore pre 2008 data has been corrected by applying the 1.3 correction factor to the annual mean in accordance with the previous guidance in LAQM.TG(03).

Short-term to Long-term Data adjustment

The estimation of annual mean concentrations from short term data has not been required.

QA/QC of automatic monitoring

The chemiluminescent monitors are calibrated on a daily basis using on site calibration gases. This involves feeding a zero air gas, followed by a span gas containing a known concentration of NO_2, through the analyser. A correction factor is then applied based on the analyser's response. The calibration reports are checked on a daily basis to check for drift and the correct application of the correction factor. Data is stored in both the raw and corrected form.

A site visit is made every month to change filters and carry out a manual calibration, which is checked against the automatic daily calibrations. Copies of the calibration reports, calibration gas logs and engineer's reports are retained on file.

All the sites are covered by a service contract provided by Casella ETI Ltd. The sites are serviced every 6 months by a Casella ETI service engineer in accordance with the manufacturer's instructions and warranty conditions. Casella ETI also provides a 48-hour call out response to cover breakdowns.

The aim is to achieve 90% data capture. In order to minimise the loss of data the procedures in box A1.4: of LAQM.TG(09) have been adopted.

Raw data is examined on a daily basis to screen out spurious and unusual measurements having regard to the recommendations in Box A1.6 of LAQM.TG(09).

QA/QC of diffusion tube monitoring

Diffusion tubes are supplied and analysed by Gradko International Ltd. in accordance with the procedures set out in the harmonisation document: "Diffusion Tubes for

Ambient NO_2 Monitoring: Practical Guidance". Gradko International Ltd is a UKAS and Workplace Analysis Scheme for Proficiency (WASP) accredited laboratory and is one of a number of laboratories which take part in the UK NO_2 diffusion tube survey, run by NETCEN.

The WASP scheme involves the use of artificially spiked diffusion tubes to test the analytical performance of the laboratory on a quarterly basis. A summary of the performance in rounds 100-104 covering 2008 has been obtained from the Local Authority Air Quality Support web site. Gradko achieved a performance criteria rating of good for this period, which is the highest rating that can be achieved.

The precision data for the laboratory obtained from the Air Quality Review & Assessment helpdesk shows the results for the 2009 and 2010 studies as having good precision.

The tubes arrive from Gradko and are stored in a refrigerator prior to being labelled with a site and date code. The tubes are then exposed in accordance with the start and end dates for the national NO_2 survey. Following exposure the tubes are capped and immediately dispatched to Gradko for analysis.

Triplicate tubes are exposed at the chemiluminescent monitoring stations in order to calculate bias correction which is applied to the yearly average to enable comparison with the annual NO_2 objective.

Wolverhampton City Council

2012 Air Quality Updating and Screening Assessment for: Wolverhampton City Council

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

December 2012

Local Authority Officer	Anna Spinks Dean Gooch
Department	Public Protection
Address	Wolverhampton City Council, Civic Centre, St Peter's Square, Wolverhampton, WV1 1DA
Telephone	01902 551155
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Report Reference number	WCCUSA2012
Date	December 2012

Executive Summary

This report has been produced as part of the on-going process of the review and assessment of air quality within the city of Wolverhampton.

The report presents monitoring data for the year 2011 and considers any new local developments which have taken place in the city since the previous Updating and Screening Assessment published in September 2009.

A review of emission sources has found that there have been no new industrial processes, or any other significant sources granted planning approval which could contribute to poor air quality since the last Updating and Screening Assessment undertaken in 2009.

A comprehensive review of all monitoring data collected since the previous Updating and Screening Assessment in 2009 has been carried out. Areas where the air quality objectives are not being met have been identified, together with any significant trends.

Recent monitoring data has identified that air quality improved across the city during 2011, resulting in a reduction in the number of areas which are exceeding the objectives for nitrogen dioxide.

The report has not identified any new areas where the nitrogen dioxide objectives are being exceeded; consequently the council has concluded that a detailed assessment for this pollutant will not be required.

A detailed assessment of PM_{10} concentrations across the city has confirmed that PM_{10} concentrations are consistently meeting the air quality objectives. The council has decided to continue to monitor the levels of this pollutant for a further twelve months prior to considering what action to take regarding the air quality management area with respect to this pollutant.

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1 Introduction

1.1 Description of Local Authority Area

Located to the north of the West Midlands conurbation, Wolverhampton is on the edge of the Black Country, some 15 miles from the regional centre of Birmingham. Wolverhampton functions as a major centre for the Black Country and the northern part of the West Midlands.

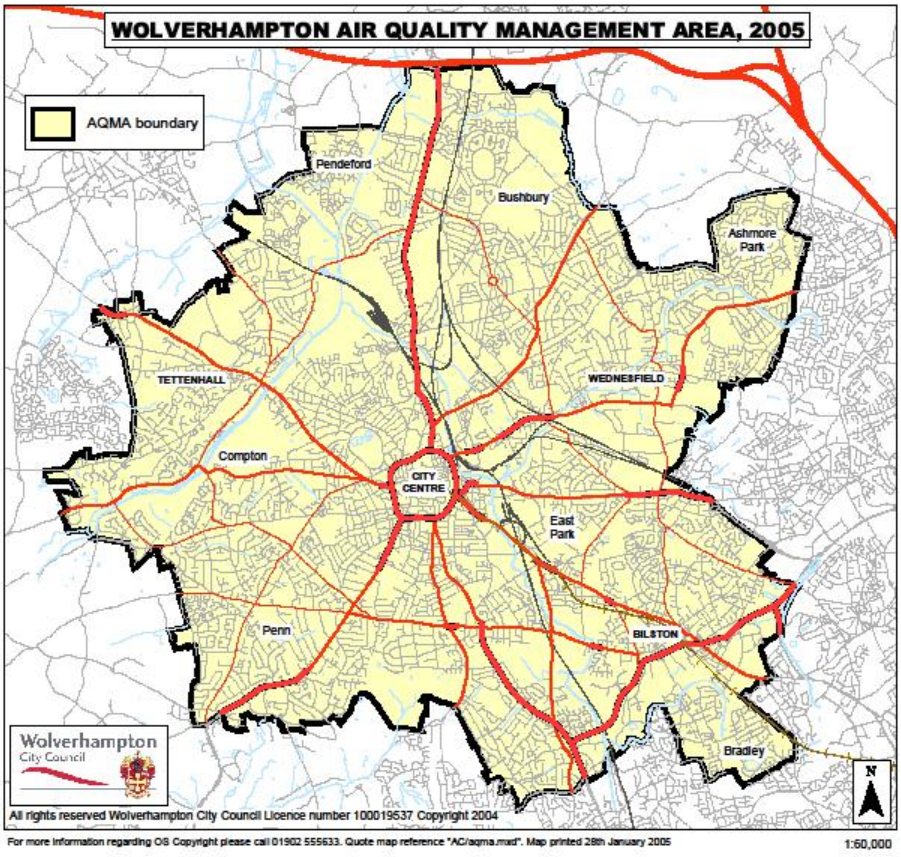
The City covers an area of 26 square miles (6,880 hectares) and has a population of around 250,000 residents. Wolverhampton is primarily an urban area with the majority of the land use being residential and industrial. However, there are areas of green space, allotments, sports grounds, isolated pockets of countryside, small lakes and ponds and farm land which make up approximately 13% of the city. These provide a variety of habitats for a wide range of plant and animal species.

Wolverhampton benefits from good communication links, with access to the national motorway network provided by the M6 and M6 toll to the east and the M54 to the north. Wolverhampton also has a mainline railway station, which provides direct trains to Birmingham, London, the West Country and the north. Proposals are currently underway to introduce a number of improvements to the railway station and its environs through the 'Wolverhampton Interchange' project.

The principal pollutant affecting the local air quality in Wolverhampton is nitrogen dioxide (NO_2). The major source of this pollutant is road traffic and there are a number of roads within the city where the air quality objective for NO_2 is being exceeded. These are primarily narrow congested streets within the city centre which have high levels of bus traffic. In response the Council declared the whole city an Air Quality Management Area (AQMA) in March 2005.

An Air Quality Action Plan (AQAP) has been prepared in conjunction with an Air Quality Stakeholder Group with close reference to the West Midlands Local Transport Plan.

Figure 1.1 Map of AQMA Boundaries



1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedences are considered likely, the local authority must then 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.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes which may require a detailed assessment to determine their impact on air quality.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre μg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 μg/m^3	Running annual mean	31.12.2003
	5.00 μg/m^3	Running annual mean	31.12.2010
1,3-Butadiene	2.25 μg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 μg/m^3	Annual mean	31.12.2004
	0.25 μg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 μg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 μg/m^3	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 μg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 μg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 μg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 μg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 μg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Assessment	Exceedences	Conclusions and Recommendations
Stage 1 Report- March 1999	Non	The report Identified 54 roads and 143 industrial processes within Wolverhampton which have the potential to be significant sources of pollution.
Stage 3 Report July 2001	Non	A recommendation to carryout detailed investigations regarding the levels of NO_2 to confirm the prediction of the model. Further monitoring for NO_2 and PM_{10} is required along busy roads and roads with high flows of bus traffic
USA May 2003	Nitrogen dioxide, particles	Identified certain areas within the city where the objectives are likely to be exceeded. A Detailed Assessment of NO_2 and PM_{10} is required for parts of the city Centre and two of the busiest junctions.
Detailed Assessment 2004	Nitrogen dioxide, particles	The Detailed Assessment confirmed that the objectives for NO_2 and PM_{10} were not being met along certain roads within the city centre and recommended the declaration of an AQMA
Section 83 (1) March 2005	Nitrogen dioxide, particles	Order designating the city of Wolverhampton an Air Quality Management Area (Appendix 1)
Annual Progress Report 2005	Nitrogen dioxide, particles	Confirmed conclusions of the Detailed Assessment and highlighted three new key developments for consideration in the 2006 USA
USA, Stage 4 Assessment and Action Plan 2006	Nitrogen dioxide, particles	Analysis of monitoring data showed that NO_2 concentrations had reduced from 2003 peak levels but continued to exceed the objectives at certain locations within the city. The levels of PM_{10} fell below the objectives during 2004 and 2005 and projected figures indicated a continuing downward trend. Nine new developments which required air quality assessments were considered. It was concluded that the developments would not result in the air quality objectives being exceeded. The action plan listed 23 actions and incorporated the Local Transport Plan into the long term air quality strategy.
Progress Report 2007	Nitrogen dioxide, particles	Monitoring data for 2006 showed the levels of NO_2 and PM_{10} increased contrary to the projected concentrations contained in the 2006 USA. Parts of the city Centre and certain busy road junctions continue to exceed the objectives for NO_2 and PM_{10}. There have been no new industrial processes or any other significant developments which could contribute to poor air quality since the 2006 USA.
Progress Report 2008	Nitrogen dioxide, particles	Levels of NO_2 and PM_{10} remain stable. There have been no new industrial processes or any other significant developments which could contribute to poor air quality since the 2006 USA.

Assessment	Exceedences	Conclusions and Recommendations
USA, Stage 4 Assessment and Action Plan 2009	Nitrogen dioxide	There are no new or significantly changed sources which could give rise to any potential exceedences outside the existing AQMA and therefore, it is not necessary to proceed to a Detailed Assessment for any of the pollutants listed in Table 1.1 Additional monitoring, or changes to the existing monitoring programme is not required.
Progress Report 2010	Nitrogen dioxide	Monitoring data for 2009 has identified that air quality improved across the city during 2009. This has resulted in a reduction in the number of areas within Wolverhampton which are exceeding the objectives. Wolverhampton City Council has concluded that a detailed assessment will not be required.

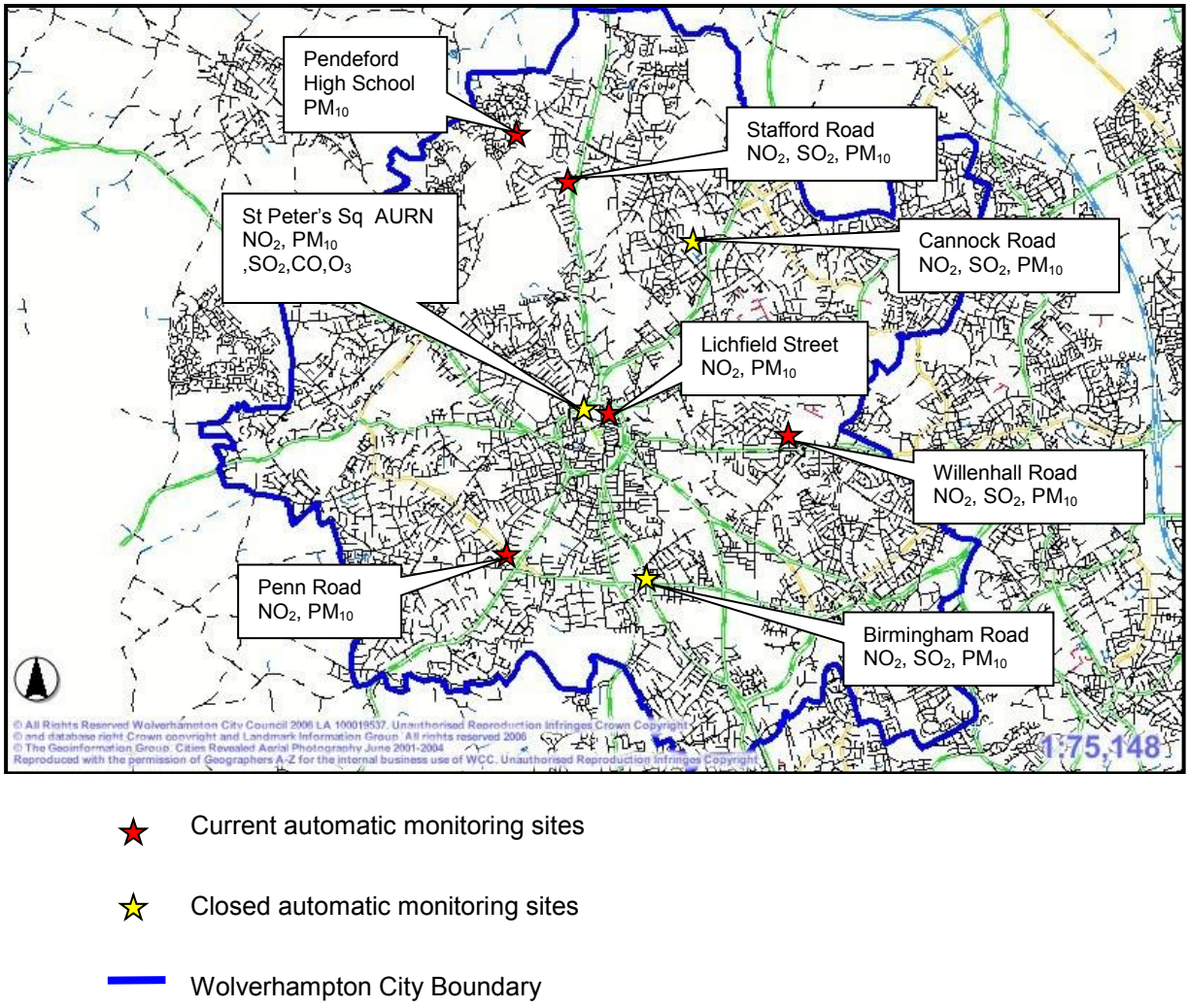
2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Wolverhampton Council operates 5 fully automatic monitoring stations, the locations of which are shown in Figure 2.1 below. These sites have been chosen to represent the worst case locations and cover the main arterial roads which link the city with major regional trunk roads and motorways. Details of the sites are given in Table 2.1.

Figure 2.1 Location of Automatic Monitoring Sites



Fixed stations are located on the A449 Stafford Road to the north which links with the M54, the A449 Penn Road to the south, and Lichfield Street which was the main access roads into the bus station and has a high flow of bus traffic.

The Council also operates a mobile monitoring station which is currently located on the A454 Willenhall Road, a main link to the M6 and Walsall. Prior to this, the mobile station was located on the A4123 Birmingham New Road and the A460 Cannock Road.

Pendeford High School station is located within the school grounds some 180m from the nearest road, and provides data relating to background levels of PM_{10}'s within the city.

Table 2.1 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In an AQMA?	Relevant Exposure ?	Distance to kerb of nearest road	Worst-case Location ?
Current sites								
A1	Lichfield Street	Roadside	391647 298784	NO_2, PM_{10}	Yes	Yes (4.5m)	2.5m	Yes
A2	Penn Road	Roadside	390374 296775	NO_2, PM_{10}	Yes	Yes (10m)	5m	Yes
A3	Pendeford High School	Background	390740 302692	PM_{10}	Yes	No	180m	No
A4	Stafford Road	Roadside	391261 302199	NO_2, SO_2 PM_{10}	Yes	Yes (10m)	8m	Yes
A5	Willenhall Road	Roadside	394754 298429	NO_2, SO_2 PM_{10}	Yes	Yes (13m)	10m	Yes
Closed sites								
A6	Cannock Road	Roadside	393030 300824	NO_2, SO_2 PM_{10}	Yes	Yes (17m)	6m	Yes
A7	Birmingham New Road	Roadside	392264 296546	NO_2, SO_2 PM_{10}	Yes	Yes (3m)	6m	Yes
A8	St Peter's Square AURN	Urban centre	391357 298939	NO_2, SO_2 PM_{10}, CO O_3	Yes	No	30m	No

2.1.2 Non-Automatic Monitoring

To complement the automatic sites NO_2 sampling is also carried out using passive diffusion tubes which are supplied and analysed by Gradko. The Council has tubes at 54 locations around the city; these are detailed in Table 2.2.

The sites represent a combination of background, intermediate, and roadside locations intended to reflect the worst case situation where the general public are likely to be exposed.

Following the 2001 Stage 3 report a number of roads were designated as intensive survey areas (ISA's). The roads which have been targeted are the main arterial routes into the city centre and those streets which are narrow and congested or have a high proportion of heavy duty vehicles (HDV's). A total of 5 diffusion tubes have been located in a "W" formation along each of these roads.

Wherever possible, diffusion tubes are located on the façades of residential property. Where this is not possible tubes are attached to lampposts or other suitable street furniture.

Since the previous updating and screening assessment, four sites in Stafford Road (Table 2.3) have been closed down and a new one opened (site ref STA9A). The results from the closed sites have showed consistent compliance with the objectives. There are still 2 remaining diffusion tube sites and an automatic monitoring site along Stafford Road at worse case locations. The new site is located on the façade of a block of apartments at the Grape Vine Island. There has been a tube at this location (STA9) for several years and the results have indicated that NO_2 levels at this location are exceeding the objective. This tube is located on street furniture close to the kerb. As the façade of the flats is 10 metres from the kerb, the new tube has been mounted on the façade to better reflect the level of exposure at this location.

Three sites in Temple Street have also been closed. These sites were originally selected to assess the proposed Summer Row development. This was a mixed residential and commercial development which has now been cancelled. There is currently no relevant exposure along Temple Street.

One site on the A41 at "The Rock" (ROC) has been closed and a new site opened on the A41 Tettenhall Road (TET) to better reflect relevant exposure on this road link. The new location is within a busy shopping area with parked cars and standing traffic and there are residential properties close to the kerb.

Table 2.2 Details of Non-Automatic Monitoring Sites closed since the previous USA

Site Name	Date Closed	OS Grid Ref		In AQMA?	Relevant Exposure?	Distance to kerb of nearest road	Worst-case Location?
ROC	Jan 2010	388995	300096	Y	Y(2.5m)	1.5m	Y
STA2	April 2010	391270	300718	Y	Y(15m)	6m	Y
STA3	April 2010	391285	301054	Y	Y(13m)	13m	Y
STA4	April 2011	391179	301534	Y	Y(10m)	13m	Y
STA8	April 2011	391317	302631	Y	Y(17m)	17m	Y
TEM1	April 2011	391543	298270	Y	N	1.5m	Y
TEM2	April 2011	391446	298269	Y	N	1.5m	Y
TEM3	April 2011	391268	298274	Y	N	1.5m	Y

A Further three new sites have been opened on, Horseley Fields (HOR), Oxford Street (OXF) and Parkfield Road (PAR). New residential apartments have been built on Horseley Fields and Oxford Street. As these are major road links it was considered necessary to assess the air quality at these locations. The Parkfield Road/Birmingham Road junction has previously been assessed using the mobile automatic monitoring station, which was moved to Willenhall Road in 2008. A diffusion tube has been located close to this junction on Parkfield Road to ensure levels of NO_2 continue to comply with the air quality objectives.

Table 2.2 Details of Non-Automatic Monitoring Sites opened since the previous USA

Site Name	Date opened	OS Grid Ref		In AQMA?	Relevant Exposure?	Distance to kerb of nearest road	Worst-case Location?
HOR	March 2011	392115	298608	Y	Y(3.2)m	2.7m	Y
OXF	March 2011	395384	296293	Y	Y(3.2m)	3.2m	Y
PAR	Jan 2011	392306	296547	Y	Y(4m)	2m	Y
STA9A	Jan 2010	391536	303348	Y	Y(12m)	12m	Y
TET	Jan 2010	389297	299886	Y	Y(3.2m)	3.2m	Y

Table 2.2 Details of Non-Automatic Monitoring sites

Site Name	Site Type	OS Grid Ref		In AQMA?	Relevant Exposure?	Distance to kerb of nearest road	Worst-case Location?
BIL1	Roadside ISA	395057	296541	Y	Y(4m)	4m	Y
BIL2	Roadside ISA	395085	296475	Y	Y(4M)	4.5m	Y
BIL3	Roadside ISA	395102	296495	Y	N	10m	Y
BIL4	Roadside ISA	395117	296454	Y	Y(2.5m)	2.5m	Y
LIC1	Roadside ISA	391698	298776	Y	N	3.5m	Y
LIC2	Roadside ISA	391508	298744	Y	Y(3m)	3m	Y
LIC3	Roadside ISA	391620	298772	Y	N	6m	Y
LIC4	Roadside ISA	391643	298786	Y	Y(1.5m)	3m	Y
LIC5	Roadside ISA	391643	298786	Y	Y(1.5m)	3m	Y
LIC6	Roadside ISA	391643	298786	Y	Y(1.5m)	3m	Y
LIC7	Roadside ISA	391019	296671	Y	N	5m	Y
LIC8	Roadside ISA	391454	298733	Y	N	3m	Y
LIC9	Roadside ISA	390375	296775	Y	Y(3m)	3m	Y
PIP1	Roadside ISA	391768	298662	Y	N	2m	Y
PIP2	Roadside ISA	391794	298560	Y	N	4m	Y
PRI1	Roadside ISA	391548	298940	Y	N	3m	Y
PRI2	Roadside ISA	391566	298795	Y	Y(3m)	3m	Y
PRI3	Roadside ISA	391607	298745	Y	Y(4.5m)	4.5M	Y
PRI4	Roadside ISA	391581	298686	Y	N	5m	Y
PRI5	Roadside ISA	391588	298612	Y	N	2.5m	Y
QUE1	Roadside ISA	391607	298652	Y	Y(2.5m)	2.5m	Y
QUE2	Roadside ISA	391622	298639	Y	N	4.5m	Y
QUE3	Roadside ISA	391662	298665	Y	Y(2.5m)	2.5m	Y
QUE4	Roadside ISA	391707	298660	Y	N	4.5m	Y
STA1	Roadside ISA	391377	299818	Y	Y(4m)	2m	Y
STA5	Roadside ISA	391261	302199	Y	Y(8.5m)	15m	Y
STA6	Roadside ISA	391261	302199	Y	Y(8.5m)	15m	Y
STA7	Roadside ISA	391261	302199	Y	Y(8.5m)	15m	Y
STA9	Roadside ISA	391527	303350	Y	Y(12m)	4.5m	Y
STA9A	Roadside ISA	391536	303348	Y	Y(12m)	12m	Y
WIL1	Roadside ISA	394266	298438	Y	Y(14.5m)	3.5m	Y
WIL2	Roadside ISA	394712	298428	Y	Y(6.5m)	6.5m	Y
WIL3	Roadside ISA	394754	298429	Y	Y(11m)	10m	Y
WIL4	Roadside ISA	394754	298429	Y	Y(11m)	10m	Y
WIL5	Roadside ISA	394754	298429	Y	Y(11m)	10m	Y
BRI	Roadside	388182	298782	Y	Y(12m)	2m	Y
BRO	Roadside	391676	298865	Y	Y(5.5m)	5.5m	Y
CAN	Roadside	393008	300867	Y	Y(14m)	6.5m	Y
CLE	Roadside	391485	298348	Y	N	5m	Y
CUL	Roadside	393371	297403	Y	Y(2.5m)	2.5m	Y
DUD	Roadside	391541	297267	Y	Y(4.5m)	3.5m	Y
HOR	Roadside	392115	298608	Y	Y(3.2)m	2.7m	Y
NEA	Roadside	394717	299894	Y	Y(6.5m)	2m	Y
OXF	Roadside	395384	296293	Y	Y(3.2m)	3.2m	Y
PAR	Roadside	392306	296547	Y	Y(4m)	2m	Y
TET	Roadside	389297	299886	Y	Y(3.2m)	3.2m	Y
TRI	Roadside	395540	296479	Y	Y(10m)	15m	Y
WAT	Roadside	391134	298877	Y	Y(11m)	3m	Y
WOL	Roadside	394031	297172	Y	Y(6m)	2m	Y
PRO	Intermediate	394633	296089	Y	N	28m	N
SPS	Intermediate	391357	298937	Y	N	30m	N
COL	Background	395855	300586	Y	N	48m	N
COLQ	Background	395855	300586	Y	N	48m	N
MAR	Background	390705	302736	Y	N	165m	N
WAR	Background	389132	296755	Y	N	50m	N
WRE	Background	392090	296095	Y	N	50m	N

Comparison of Monitoring Results with AQ Objectives

2.1.3 Nitrogen Dioxide

Automatic Monitoring Data

Data from the automatic monitoring stations is presented in Table 2.4 and Table 2.5 below; exceedences of the objectives are highlighted in red.

In April 2010 work started on phase 1 of the Wolverhampton interchange project which comprised of the redevelopment of the bus station (section 3.7). Whilst the location of the bus station has not changed, a new access road has been constructed directly off the ring road which has reduced the amount of bus traffic within the town centre and Lichfield Street in particular.

The Levels of NO_2 dropped significantly along Lichfield Street in 2010 and have remained below the objectives following the reopening of the bus station in April 2011.

Table 2.4 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2011 %	Annual mean concentrations (distance corrected) µg/m^3		
				2009	2010	2011
A1	Lichfield Street	Y	99	**57**	40	36
A2	Penn Rd	Y	96	**46**	**46**	38
A4	Stafford Rd	Y	99	38	38	34
A5	Willenhall Rd/Neachells Lane	Y	96	36	**46**	38

Table 2.5 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2011 %	Number of Exceedences of hourly mean (200 µg/m^3)		
				2009	2010	2011
A1	Lichfield Street	Y	99	6	0	1
A2	Penn Rd/Goldthorne Hill	Y	96	1	0	0
A4	Stafford Rd/Church Rd	Y	99	0	0	0
A5	Willenhall Rd/Neachells Lane	Y	96	1	4	0

There were no exceedences of the NO_2 air quality objectives at these locations during 2011.

Diffusion Tube Monitoring Data

Diffusion tube results for 2010 are shown in Table 2.6. The annual average for each site is presented as the bias corrected measured value, corrected for distance to relevant receptor in accordance with the procedure detailed in Box 2.3 of technical Guidance LAQM.TG(09). Exceedences of the annual mean objective value are highlighted in red.

The bias correction is obtained from the co-location of triplicate tubes alongside the Stafford Road and Lichfield Street automatic monitoring stations.

Table 2.7 provides a summary of the results from the intensive survey areas, the remaining roadside tubes and the background tubes for 2009, 2010 and 2011. The results are presented as the annual mean concentration calculated from the individual tubes located along each particular road corrected for bias and distance.

Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA	% Data capture 2011	Annual mean concentration µg/m³ (adjusted for bias and distance)		
				2009 (Bias 1.07)	2010 (Bias 0.97)	2011 (Bias 0.89)
BIL1	Lichfield St, Bilston	Y	100	**47**	**45**	37
BIL2	Lichfield St, Bilston	Y	92	35	37	32
BIL3	Lichfield St, Bilston	Y	75	38	36	33
BIL4	Lichfield St, Bilston	Y	92	39	38	33
LIC1	Lichfield St	Y	83	**56**	38	33
LIC2	Lichfield St	Y	92	**49**	**46**	**45**
LIC3	Lichfield St	Y	83	**58**	**41**	36
LIC4[1]	Lichfield St	Y	100	**48**	40	32
LIC7	Lichfield St	Y	92	**53**	39	33
LIC8	Lichfield St	Y	100	**41**	37	31
LIC9	Lichfield St	Y	100	**56**	**41**	34
PIP1	Pipers Row	Y	92	**48**	**42**	37
PIP2	Pipers Row	Y	100	**43**	**43**	35
PRI1	Stafford St	Y	100	40	**42**	39
PRI2	Princess Sq	Y	100	**48**	**44**	38
PRI3	Princess St	Y	100	**42**	39	32
PRI4	Princess St	Y	100	**51**	**49**	**48**
PRI5	Princess St	Y	100	**43**	**42**	35
QUE1	Queen St	Y	92	37	**43**	36
QUE2	Queen St	Y	100	**44**	**46**	**41**
QUE3	Queen St	Y	100	**42**	**55**	**46**
QUE4	Queen St	Y	100	**45**	**44**	41
STA1	Stafford Rd	Y	100	34	33	28
STA3	Stafford Rd	Y	NA	30	33	Closed
STA4	Stafford Rd	Y	NA	27	29	Closed
STA5[1]	Stafford Rd	Y	100	34	37	34
STA8	Stafford Rd	Y	NA	29	29	Closed
STA9	Stafford Rd	Y	58	**45**	No result	**47**[2]
STA9A	Stafford Rd	Y	92	New site	38	31
TEM1	Temple St	Y	NA	36	34	Closed
TEM2	Temple St	Y	NA	32	30	Closed
TEM3	Temple St	Y	NA	32	32	Closed
WIL1	Willenhall Rd	Y	100	39	26	23
WIL2	Willenhall Rd	Y	100	**45**	**42**	36
WIL3[1,]	Willenhall Rd	Y	100	31	37	30
PAR	Birmingham Rd	Y	92	New site		31
BRI	Bridgnorth Rd	Y	100	30	27	21
BRO	Broad St	Y	100	**49**	**47**	**44**
CAN	Cannock Rd	Y	92	**33**	31	28
CLE	Cleveland St	Y	100	37	36	31
CUL	Culwick St	Y	100	32	29	23
DUD	Dudley Rd	Y	100	33	30	26
HOR	Horseley Fields	Y	58	New site		36[2]
NEA	Neachells Lane	Y	100	27	26	22
OXF	Oxford Street	Y	75	New site		25
ROC	The Rock	Y	NA	**43**	Closed	Closed
TET	Tettenhall Road	Y	83	New site	**41**	38
TRI	Trinity St	Y	92	27	30	24
WAT	Waterloo Rd	Y	92	39	37	30
WOL	5 Wolsley Rd	Y	83	21	26	19
PRO	Prosser St	Y	100	29	27	25
SPS	St Peter's Sq	Y	100	28	28	23
COL	Coleman Ave	Y	92	20	20	16
MAR	Marsh Lane	Y	100	16	17	13
WAR	Warstones Rd	Y	100	16	17	14
WRE	W'ton Rd East	Y	100	18	20	15

[1] Mean of triplicate tubes [2] Annualised data (Appendix A)

Table 2.7 Results of Nitrogen Dioxide Diffusion Tubes: ISA, roadside, intermediate and background sites

Location	Within AQMA	Annual mean concentration µg/m^3 (adjusted for bias and distance)		
		2009 (Bias 1.07)	2010 (Bias 0.97)	2011 (Bias 0.89)
Lichfield St, Bilston	Y	40	39	34
Lichfield St, East of Princess Sq	Y	**55**	40	34
Lichfield St, West of Princess Sq	Y	**46**	**41**	37
Princess St/Stafford St	Y	**45**	**43**	38
Queen St	Y	**42**	**47**	**41**
Stafford Rd	Y	34	33	31
Willenhall Rd	Y	39	35	30
Pipers Row	Y	**46**	**42**	36
Temple St	Y	33	32	Discontinued
Roadside sites	Y	35	33	29
Intermediate sites	Y	29	28	24
Background sites	Y	18	19	15

The data collected from the automatic monitoring stations and the diffusion tube sites has identified that the annual mean NO_2 concentrations have fallen significantly since the previous updating and screening assessment in 2009. The NO_2 objective was exceeded during 2011 at the following locations within the city:

Roadside ISA's:

- Queen Street

Roadside point locations:

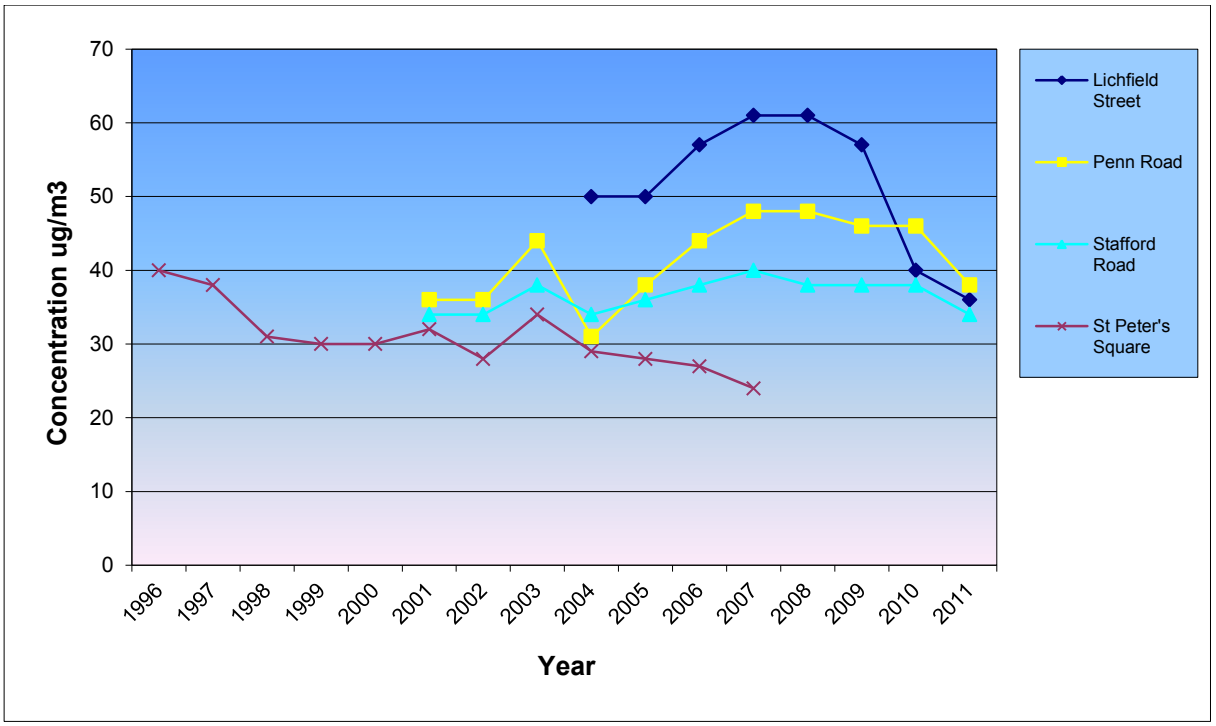
- BRO Broad Street
- LIC2 Lichfield Street West of Princess Sq
- PRI4 Princess Street at King Street

This represents a significant reduction in the numbers of exceedences compared with the previous report.

Long Term Trends

Average NO_2 concentrations from the 4 longest running automatic monitoring stations are presented in Figure 2.2.

Figure 2.2 Trends in Annual Mean Nitrogen Dioxide Concentrations measures at Automatic Monitoring Sites



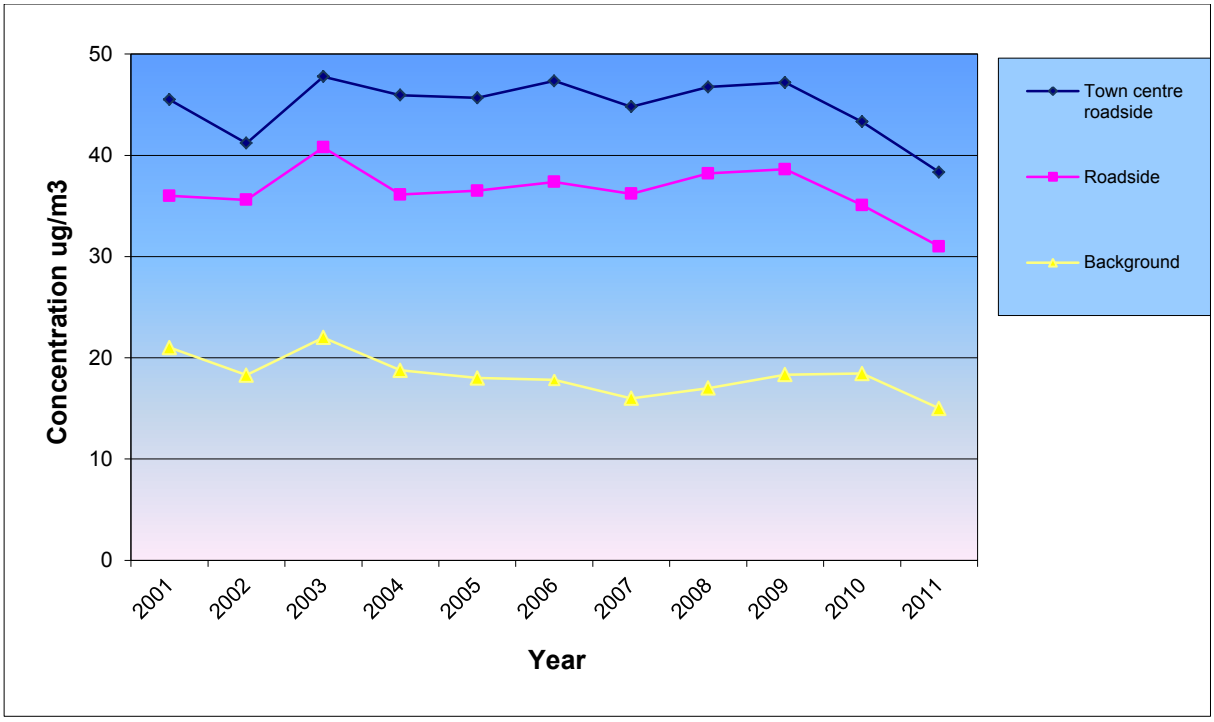
St Peter's Square monitoring station operated from 1996 through to 2007 and was located 30 metres from the ring road. The results from this site show an overall reduction in NO_2 concentrations over that period.

In 2003 concentrations of NO_2 increased markedly in 2003 due to the unusually stable weather conditions during that year. Between 2004 and 2008 roadside concentrations of NO_2 increased. However, since 2008 NO_2 has decreased, this is particularly evident during 2011 when annual mean concentrations dropped by up to 7 ug/m^3.

Prior to 2010 the concentration of NO_2 in Lichfield Street was considerably higher than at other roadside locations due to the numbers of buses travelling along the road. Since the completion of phase 1 of the interchange project NO_2 levels have fallen significantly and are now typical of other roadside locations.

The diffusion tube data presented in figure 2.3 below shows that background and roadside concentrations of NO_2 remained fairly stable between 2001 and 2009. In 2003 there was an increase in NO_2 concentrations at all sites, which is consistent with the data from the automatic stations. Since 2009 there has been a reduction in NO_2 levels at roadside and town centre sites.

Figure 2.3 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites



2.1.4 PM_{10}

Tables 2.8 and 2.9 present a summary of TEOM data from the automatic monitoring stations for 2009, 2010 and 2011. This data has been corrected using the King's College volatile correction model (VCM) as required by technical guidance document LAQM.TG(09).

Table 2.8 Results of PM_{10} Automatic Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2011 %	Annual mean concentrations (μg/m^3)		
				2009	2010	2011
A1	Lichfield Street	Y	100	29	21	23
A2	Penn Road	Y	100	22	24	25
A3	Pendeford High School	Y	100	16	16	19
A4	Stafford Road	Y	100	21	22	23
A5	Willenhall Road	Y	94	20	21	23

There have been no exceedences of the PM_{10} annual mean objective during 2009, 2010 or 2011.

Table 2.9 Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2011 %	Number of Exceedences of hourly mean (50 μg/m^3) *If data capture < 90%, include the 90th %ile of hourly means in brackets.*		
				2009	2010	2011
A1	Lichfield Street	Y	100	**40**	2	16
A2	Penn Road	Y	100	6	0	15
A3	Pendeford High School	Y	100	2	0	7
A4	Stafford Road	Y	100	7	0	11
A5	Willenhall Road	Y	94	5	0	14

The number of exceedences increased at Lichfield Street dropped significantly in 2010 following the implementation of phase 1 of the interchange project. There were no exceedences of the 24-hr mean objective during 2011.

Long Term Trends

In order to compare the data with the annual and 24 hour mean objectives, TEOM data has been corrected in accordance with the technical guidance. Prior to 2008 the correction factor was 1.3, which was replaced by the volatile correction model in 2008. The change to the correction factor has resulted in a step change in the data, therefore for the purpose of showing long term trends, uncorrected data has been used for the annual mean concentrations, and uncorrected data multiplied by 1.3 for the number of exceedences.

Figure 2.4 Trends in Annual Mean PM_{10} Concentrations TEOM

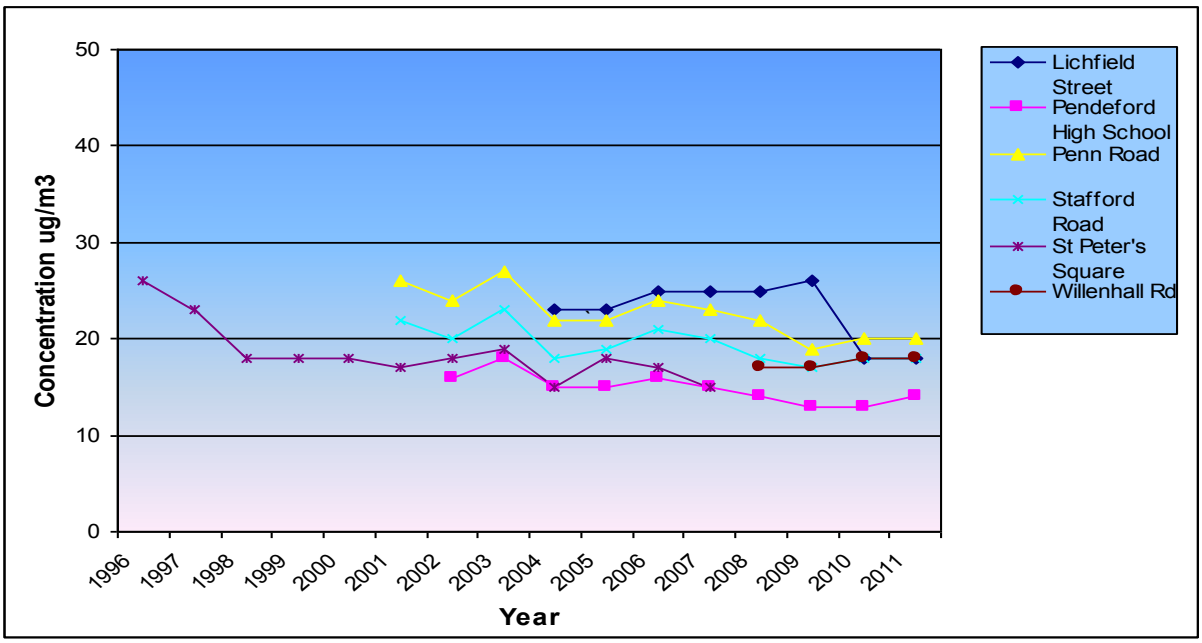
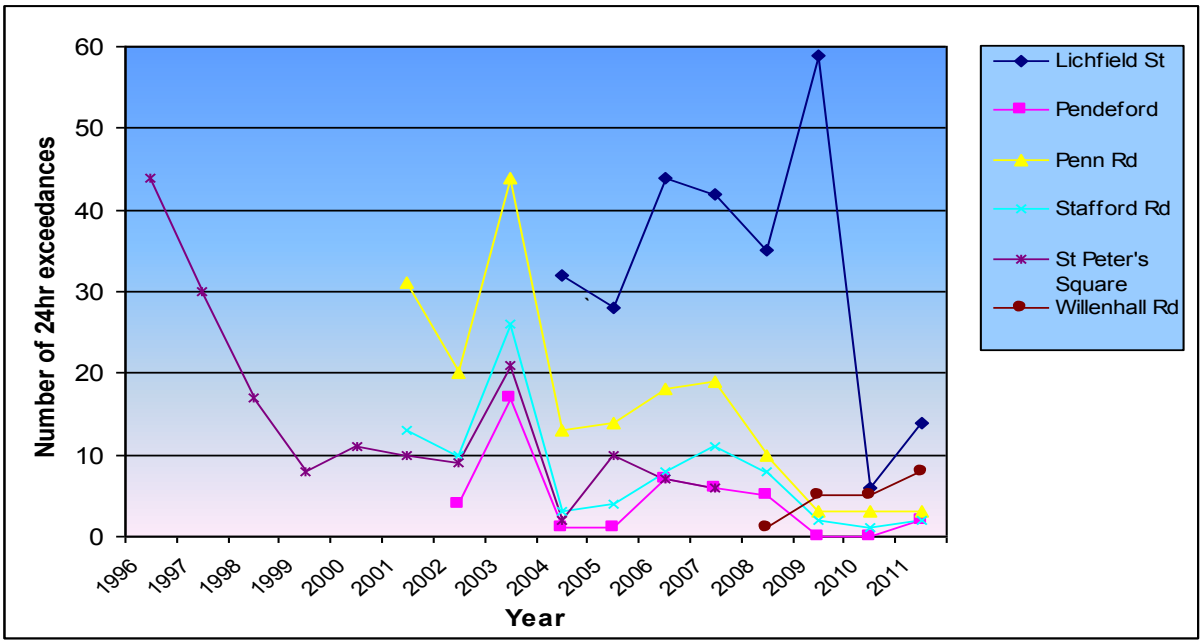


Figure 2.5 Trends in the number of exceedences of the 24 hour mean objective TEOM x 1.3



The general trend in the PM_{10} levels at all of the monitoring sites is down however, there have been several years where PM_{10} levels have increased at all locations across the city. As with NO_2 concentrations the most notable of these was 2003, during which there was a significant increase in the annual mean and the number of exceedences of the 24 hour mean. These yearly fluctuations in PM_{10} levels are due

to the particular weather conditions prevailing at the time, rather than increases in local PM_{10} emissions.

In 2009 there was a localised increase at Lichfield Street due to major building works taking place for most of that year. Since the completion of the bus station interchange project, PM_{10} levels have decreased dramatically and no longer exceed the objectives.

The PM_{10} data since 2008 has shown that PM_{10} levels are now below the objectives and are likely to remain so despite yearly variations. The council has therefore decided to continue to review the data for another 12 months before considering whether to make any amendments to the AQMA for PM_{10}.

2.1.5 Sulphur Dioxide

There have been no exceedences of the 15 minute, 1 hour or 24 hour objectives during 2009, 2010 or 2011.

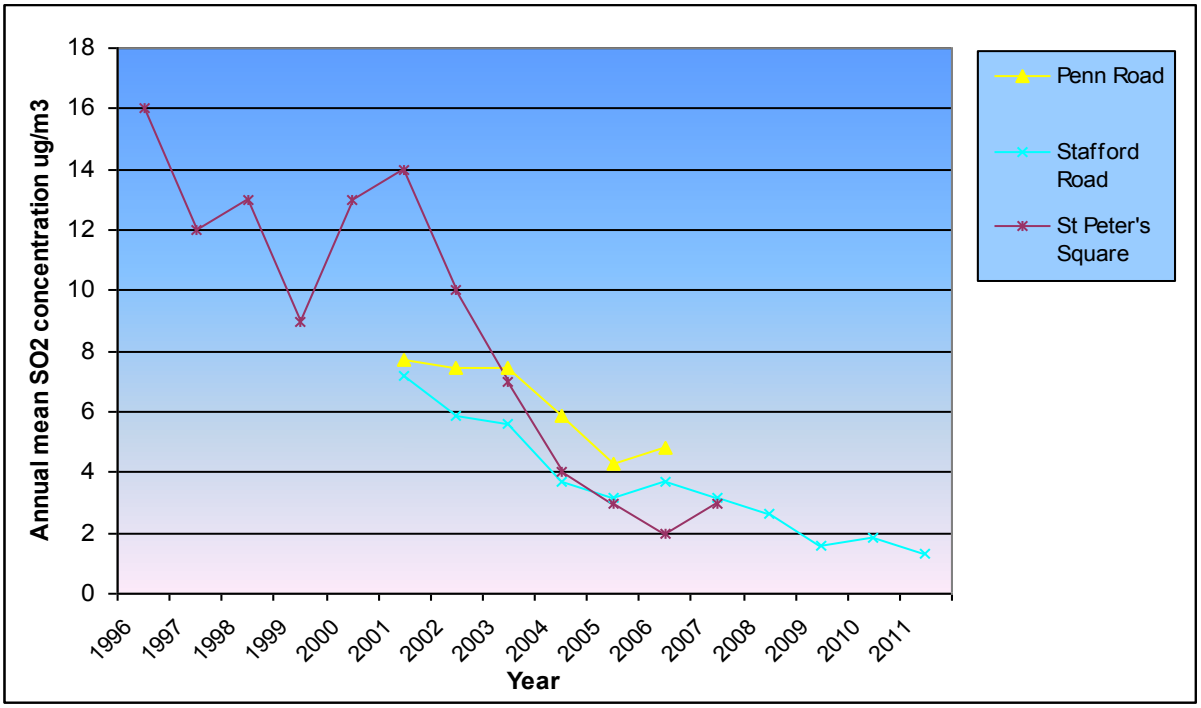
Table 2.10 Results of SO_2 Automatic Monitoring: Comparison with Objectives

Site ID	Location	Within AQMA?	Data Capture 2011 %	Number of Exceedences of: (/m^3)		
				15-minute Objective (266 µg/m^3)	1-hour Objective (350 µg/m^3)	24-hour Objective (125 µg/m^3)
A4	Stafford Road	Y	97	0	0	0
A5	Willenhall Road	Y	95	0	0	0

Long term trends

The levels of sulphur dioxide have dropped significantly since the 1990's. The rate of decline has slowed over recent years, however the annual mean concentrations of SO_2 are continuing to fall.

Figure 2.6 Trends in SO_2 Concentrations



2.1.6 Benzene

There are no significant sources of benzene in the city therefore the council does not consider it necessary to monitor for this pollutant.

2.1.7 Summary of Compliance with AQS Objectives

Wolverhampton City Council has examined the results from the air monitoring sites in the city. During 2011 the concentration of nitrogen dioxide is exceeding the annual mean objective at the following relevant locations within the declared AQMA:

Roadside ISA's:

- Queen Street

Roadside point locations:

- BRO Broad Street
- LIC2 Lichfield Street West of Princess Sq
- PRI4 Princess Street at King Street

As the whole of the city has been declared an AQMA based on previous exceedences, it is not necessary to proceed to a detailed assessment at these locations.

3 Road Traffic Sources

LAQM.TG(09) requires the road types detailed below (3.1-3.6) to be identified and considered in terms of their emissions. At the beginning of the Review and Assessment process, traffic data was obtained from the West Midlands Joint Data Team and used to model NO_2 and PM_{10} concentrations across the region.

Table 3.1 presents the planning applications which have been received by the council since the previous assessment and were accompanied by an air quality assessment, or where one has been requested.

Table 3.1 Planning applications requiring or including an air quality assessment

Site	Application number	Proposal	Air Quality assessment
Bilston Urban Village	Pre application enquiry	Biomass plant	Air quality assessment requested should a full application be submitted. To date a full application has not been received.
Peel Retail Park Stafford Street	09/00475/OUT	New supermarket	Air quality assessment requested should a full application be submitted
Bus station and surrounding areas	09/00484/FUL 09/00486/DNF	Provision of interim bus layover space New bus station and access roads	Air quality assessment submitted as part of the planning applications. The assessment concluded that the development would have no significant adverse effect on air quality.
32-54 Lunt Road	09/01159/FUL	Erection of 19 dwellings	Air quality assessment requested due to the proximity of the site to the Black Country Route. The report concluded that the objectives are not likely to be exceeded at this location.
Land West of Raglan Street	11/00430/FUL	New Sainsbury's supermarket	Air quality assessment submitted as part of the planning application. The assessment concluded that the development would not have a significant adverse effect on air quality
Former Royal Hospital site Cleveland Rd	11/00365/FUL	New Tesco supermarket	Air quality assessment submitted as part of the planning application. The assessment concluded that the development would not have a significant adverse effect on air quality

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Wolverhampton City Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

Wolverhampton City Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

Wolverhampton City Council confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

Wolverhampton City Council confirms that there are no new/newly identified busy junctions/busy roads.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

Wolverhampton City Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

The most recent traffic data for where available, is presented in Appendix B. The data shows that there has been an overall reduction of 3% in road traffic between 2008 and 2010.

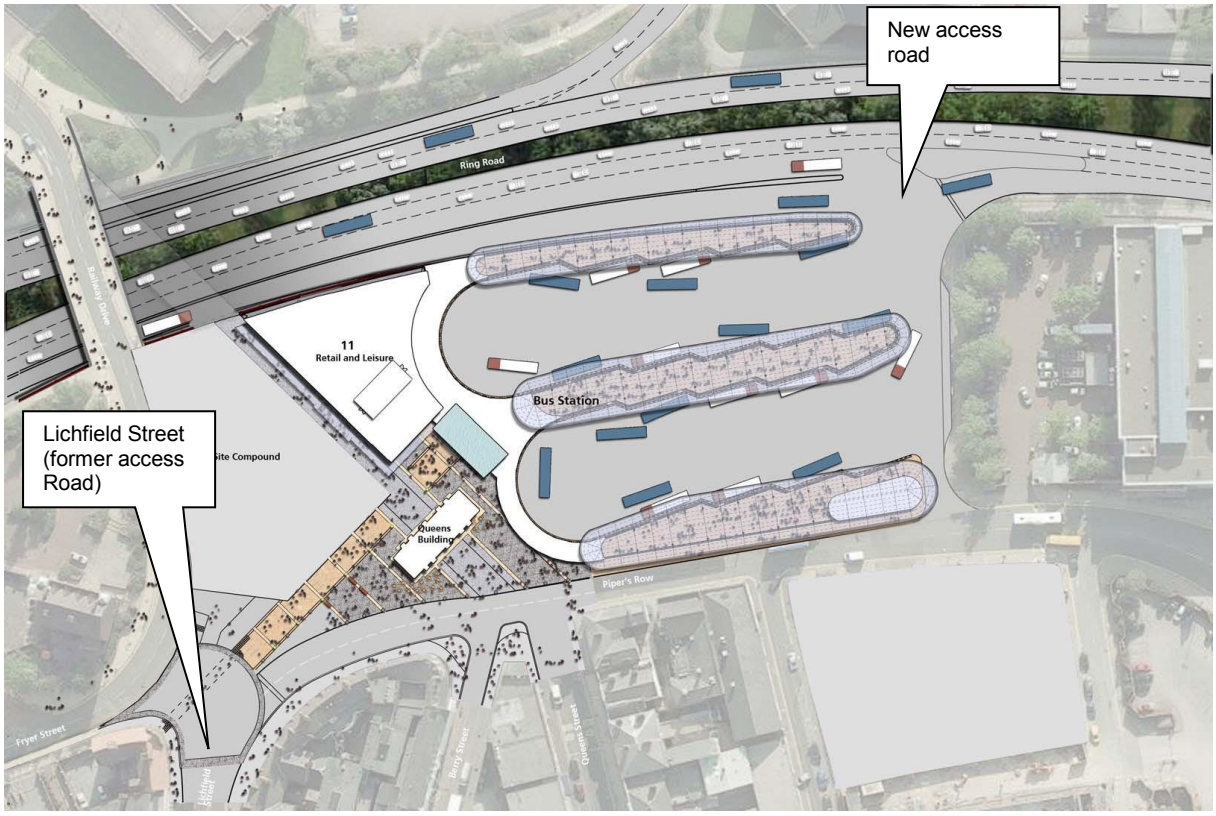
The technical guidance note LAQM.TG(09) requires any road where traffic has increased by more than 25% since the previous assessment to be considered further. A comparison of the available traffic counts shows that traffic on the B4163 Highfields Road increased by 28% between 2008 and 2010. However, the 2006 traffic count for Highfields Road is only 3% lower than the 2010 count. This suggests that there was a decrease in traffic at some time prior to the 2008 count, followed by a returned to more typical levels by 2010. During this time a major urban regeneration project was on going to the north of Highfields Road. As part of this project Dudley Street, which joins Highfields Road to the west of the location of the traffic count, was closed to through traffic and is likely to have caused the reduction in traffic on Highfields Road in 2008. It is therefore considered unnecessary to consider this road further.

Wolverhampton City Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

The interchange project is an integral part of the council's air quality management plan. Phase 1 of the project (see figure 2.7) comprises of the redevelopment of the town centre bus station and the construction of a new access road off St David's Ring Road. This has reduced the number of buses travelling along Lichfield Street where the NO_2 objective was being exceeded. As part of the planning process for this development an air quality assessment was carried out. The assessment concluded that the development would have no significant adverse effect on air quality.

Figure 2.7 Plan of Phase 1 of the Interchange project



During the construction phase Lichfield Street was closed to bus traffic and temporary bus stops established in Queen Street, Stafford St and Darlington Street. This caused an increase in NO_2 concentrations along Queen Street and Stafford Street during 2010. Monitoring data is not available for Darlington Street as there is no relevant exposure along this road.

The completion of phase 1 has brought about a drop in the levels of nitrogen dioxide and PM_{10} in Lichfield Street, Princess Street, Queen Street, and Pipers Row. This has been achieved through a reduction in bus traffic along these roads.

Wolverhampton City Council has assessed the new bus station, and concluded that it will not be necessary to proceed to a Detailed Assessment.

4 Other Transport Sources

4.1 Airports

Wolverhampton City Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

Wolverhampton City Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

Wolverhampton City Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

Wolverhampton City Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been carried out

Wolverhampton City Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

Wolverhampton City Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

Wolverhampton City Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

There are no major fuel (petrol) storage depots within the Local Authority area.

5.3 Petrol Stations

Wolverhampton City Council confirms that there are no petrol stations meeting the specified criteria.

5.4 Poultry Farms

Wolverhampton City Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

The Council has identified the following biomass combustion plants within the City.

Table 6.1 Biomass combustion plant within Wolverhampton City boundary

Location	Type	Distance to relevant receptors
ACT Office Furniture Manufacturers Ltd., Unit A Salop Street, Bilston Wolverhampton WV14 0TQ	Talbott T500	47m
All Saints Action Network, All Saints Road, All Saints Wolverhampton. WV2 1EL.	Talbott CA	22m
Goodrich Actuation Systems Ltd., Stafford Road Wolverhampton WV10 7EH.	Talbott T300	230m
Heath Town Flats, 1 Hobgate Road, Wednesfield, Wolverhampton WV10 0PR	Fröling Lambdamat 1000	20m
Midland Joinery Services Ltd, Unit L, Cross Street, Atlas Trading Estate, Bilston, West Midlands, WV14 8TJ.	Talbott T3A	65m
Swift Save UK Ltd, Bell Pl, Wolverhampton, WV2 4LY	Talbott T500	45m
The Willows Energy Centre, Stowlawn Primary School, Green Park Avenue, Bilston WV14 6EH	KWB TDS Powerfire 150 biomas boiler	40m

Table 6.2 Biomass combustion plant close to Wolverhampton City boundary

Location	Type	Distance to relevant receptors
Pendeford Farm Children's Home, Wobaston Road Wolverhampton	Hoval Biolyt 50	65m

These have been screened for NO_2 and PM_{10} in accordance with Technical Guidance: "Screening assessment for biomass boilers" (Appendix C). The maximum emission rates of NO_2 and PM_{10} have been estimated for each plant using the appropriate emission factors from the technical guidance note. These have been compared with the target emission for the appliance which has been obtained from the biomass calculator. This uses the chimney height of the appliance to calculate

the maximum emission rate below which the ground level concentration of each pollutant will not give rise to exceedences of the objectives.

Difficulties were experienced using the nomogram (fig 5.19 Technical Guidance note TG(09)), and the biomass calculator, as the 2 methods produce different results for the maximum emission rates. The nomogram in TG(09) gives a much lower value for the maximum emission rate, indicating that relatively small biomass plants would require a detailed assessment. The biomass calculator suggests that a detailed assessment is not necessary; and local experience would tend to confirm that emissions from these combustion plants do not give rise to excessive ground level concentrations.

Further guidance was obtained from the local authority support helpdesk operated by AEA Energy & Environment and Bureau Veritas. The helpdesk advisor recommended a cautionary approach when using the effective stack height and suggested calculating the maximum emissions rates from the nomogram using the actual stack height of the combustion plant.

Based on this advice the screening assessment indicates that the emissions from each appliance do not exceed their respective target emission and therefore a detailed assessment is not required.

Wolverhampton City Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Biomass Combustion – Combined Impacts

Approximately 75% of the city is covered by smoke control orders which preclude the burning of coal and wood on appliances which are not exempt by Statutory Instruments under the Clean Air Act 1993. Exempt appliances have passed tests to confirm that they are capable of burning coal or wood which are inherently smoky solid fuels, without emitting smoke. The locations of the appliances identified in section 6.1 above are not concentrated in clusters. The Council is not aware of any other significant concentrations of biomass combustion appliances within the commercial and domestic sectors of the city.

Wolverhampton City Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.3 Domestic Solid-Fuel Burning

As discussed in section 6.2 above, 75% of the city is covered by smoke control orders which preclude the burning of coal and wood on domestic fires and other appliances which are not exempt from the provisions of the Clean Air Act. Those areas of the city which are not subject to smoke control orders are predominantly industrial and commercial consequently domestic coal burning is not significant.

Wolverhampton City Council confirms that there are no areas of significant domestic fuel use within its area.

7 Fugitive or Uncontrolled Sources

Wolverhampton City Council confirms that there are no potential sources of fugitive particulate matter emissions within its area.

8 Air Quality Planning Policies

8.1 The Black Country Joint Core Strategy

The Black Country Core Strategy, which was adopted in February 2011, has been developed in conjunction with Dudley, Sandwell, and Walsall Councils'. It is a spatial planning document that sets out the vision, objectives and detailed spatial strategy for future development in The Black Country up to 2026. The document does not just consider land use, but also a comprehensive range of environmental, economic and social issues.

The Core Strategy allocates areas for housing where there are good public transport links, and retains employment land where there is good access to motorway networks. This will minimise traffic and congestion and so reduce air quality problems caused by traffic.

Policy ENV8 – Air Quality was developed jointly by air quality and planning officers in the context of the National Air Quality Strategy and the designated air quality management areas covering the Black Country. The Policy requires sensitive development to be located where air quality meets national air quality objectives and clarifies when an air quality impact assessment and mitigation measures will be required.

9 Local Transport Plans and Strategies

9.1 West Midlands Local Transport Plan 3

The West Midlands Local Transport Plan 2011 - 2026 (LTP3) is a statutory document which looks at the transport needs of the Metropolitan Area and sets out a way forward to deliver those needs through short, medium and long term transport solutions.

The LTP3 identifies how our transport network can play its part in the transformation of the West Midlands economy. It demonstrates how this will bring real benefits to people through its contribution to economic revival, creation of jobs, improved accessibility, improved local and national connections by road and rail and better quality of life.

A key objective of the LTP3 vision is air quality and climate change. The LTP3 target for air quality is reproduced below:

"2015/16 Performance Aim
A net reduction of Nitrogen Dioxide (NO_2) in those areas, as confirmed by each local authority within the West Midlands, where the annual average NO_2 values are predicted to exceed 40µg/m^3 between 2008 (baseline) and 2015".

9.2 The Black Country Joint Core Strategy

The Joint Core Strategy recognises the key role which the transport network plays in maintaining the economic wellbeing of the region. The strategy contains specific policies for providing an efficient and reliable transport network and links in with the LTP3.

9.3 Wolverhampton Cycling Strategy

The Council adopted the current Cycling Strategy in 1995 and has made good progress in implementing its proposals. The Government published 'The National Cycling Strategy' in 1996 and the Cycling Strategy for the West Midlands is set out in the Local Transport Plan. This provides a framework to identify specific problems encountered by cyclists and provides some of the solutions to address these.

In support of this the Black County Core Strategy contains specific targets for creating coherent networks for cycling and for walking. The joint working between the four local authorities will ensure that the Black Country has a comprehensive cycle network based on integrating the four local cycle networks, including common cycle infrastructure design standards.

9.4 Wolverhampton Walking Strategy

The walking strategy aims to encourage walking by recognising its role as a mode of transport and acknowledging that walking forms part of the solution to tackling traffic congestion.

The Strategy provides a framework for the Council to identify specific problems encountered by pedestrians and factors that deter walking in Wolverhampton and seeks to provide some of the solutions to address these. Many of the solutions are ones of information and maintenance and do not require very technical or major infrastructure solutions.

9.5 Network West Midlands

Network West Midlands connects all public transport in the West Midlands metropolitan area. This includes Birmingham, Dudley, Sandwell, Coventry, Walsall, Solihull and Wolverhampton.

It clearly identifies the complete network of bus, rail and Metro services that are easily accessible to most people in the West Midlands region.

9.6 Traveline

Traveline is a partnership of transport operators and local authorities formed to provide impartial and comprehensive information on public transport. It operates across England, Scotland and Wales.

In the West Midlands area the Traveline service is operated by West Midlands Transport Information Services Ltd (WMTIS). WMTIS is a not for profit organisation jointly funded by Centro who are the West Midlands Passenger Transport Executive and the West Midlands Integrated Transport Authority for the region, the local bus operators, County Councils and Unitary Authorities in the region.

WMTIS provides details of all registered bus services within the West Midlands regions an area that includes Herefordshire, Shropshire, Staffordshire, Stoke-on-Trent, Telford and Wrekin, The West Midlands Conurbation, Warwickshire and Worcestershire. We also hold certain information on public transport links in other areas of the country.

9.7 Wolverhampton TravelWise

Act TravelWise is a national campaign to promote and encourage sustainable and healthy travel choices, rather than relying on the car for all journeys. Act TravelWise helps people to consider what options other than the car might be available to them, particularly for shorter journeys.

The West Midlands TravelWise Group and Wolverhampton TravelWise work closely with Local Authorities in the Region, Centro and Public Transport Operators to improve conditions for people who walk, cycle and use public transport. Centro and Travel West Midlands are key partners in Company TravelWise and offer discounts to the employees of those organisations that sign up to the scheme.

9.8 Help2Travel

The Help2Travel website provides travel information to the public and has been developed as part of a European project for intelligent transport information systems. It provides users with a comprehensive overview of traffic & travel in the West Midlands region. It includes information about roadwork's and incidents on the region's roads, real-time train and bus information, as well as information & links to car parking, cycling and air quality information.

The system also enables up to the minute travel information to be exchanged easily between transport authorities, allowing them to respond more quickly and efficiently to travel problems.

10 Climate Change Strategies

10.1 Wolverhampton Declaration on Climate Change

In December 2006 the Council signed the Wolverhampton Declaration on Climate change which commits the Council to work to address both the causes and impacts of a changing climate in all its work.

10.2 Climate Change Strategy and Action Plan

The Climate Change Strategy and Action Plan for Wolverhampton 2009-2012 has been developed in fulfilment of the Wolverhampton Declaration on Climate Change. The Strategy addresses climate change through mitigation (reducing our CO2 emissions) and adaptation to future climate change.

Through the Climate Change Strategy and Action Plan the Council will strive to secure a sustainable quality of life in the long term for everyone associated with the city.

10.3 Carbon Management Plan

The council is committed to reducing greenhouse gas emissions from our operations and activities, and have been working in partnership with the Carbon Trust to develop a Carbon Management Strategy.

The Council's Carbon Management Plan was adopted in 2008 and addresses the Council's own activities.

The plan outlines projects that we will take forward in order to reduce carbon emissions by 25% by 2015 from our operations, including:

- reductions from council buildings (including schools)
- fleet vehicles and transportation
- staff commuting
- street lighting.

In July 2012 the Council adopted a new approach to promoting sustainability, including climate change and carbon management. As part of this both the Climate

Change Strategy and Action Plan, and the Carbon Management Plan will be reviewed. Following on from this a new Sustainability Strategy and Implementation Plan will be produced.

10.4 The Black Country Joint Core Strategy

The Core Strategy identifies the main ways in which activity in The Black Country contributes towards climate change, together with ways of reducing and adapting to it.

10.5 The West Midlands Regional Spatial Strategy (RSS, 2004),

This strategy provides a regional strategic context for local planning decisions, and has a responsibility to help meet national targets for the reduction of greenhouse gases. The Regional Planning Body is expected to consider how the region's activities contribute towards climate change and how the region might be vulnerable to the impacts of climate change, by working with partners to develop a realistic and responsible approach to climate change in the region. This will require establishing comprehensive and up to date data in order to enable the local authorities and agencies to develop coordinated and effective solutions. Guiding principles were used in developing the Spatial Strategy to ensure that policies to assist the reduction of greenhouse gas emissions are an integral part of the West Midlands Regional Spatial Strategy.

10.6 The Wolverhampton City Strategy 2011-2026

The City Strategy includes, in its implementation plan, action RIC C1.6, the development of an integrated approach to the delivery of sustainability priorities across the city. This refers to the development of a Sustainability Strategy and Implementation Plan as mentioned above.

11 Conclusions and Proposed Actions

11.1 Conclusions from New Monitoring Data

The Council has carried out a comprehensive review of all monitoring data gathered since the previous Updating and Screening Assessment in 2009. Areas where the air quality objectives are not being met have been identified together with any significant trends.

11.1.1 Nitrogen dioxide data

Data collected since the previous Updating and Screening assessment has shown that the number of locations exceeding the air quality objective for nitrogen dioxide has reduced significantly: In 2011 the following locations were exceeding the objective

Roadside ISA's:

- Queen Street

Roadside point locations:

- BRO Broad Street
- LIC2 Lichfield Street West of Princess Sq
- PRI4 Princess Street at King Street

11.1.2 PM_{10} data

Since 2008 there have been no exceedences of the PM_{10} air quality objective. A detailed examination of trend data has shown that there has been a significant reduction in PM_{10} concentrations in real terms over the last 10 years.

The Council has concluded that PM_{10} concentrations are consistently meeting the air quality objectives, however the council has decided to review the data for a further 12 months before making any decisions relating to amending the AQMA.

11.2 Conclusions from the assessment of sources

The Updating and Screening Assessment has considered the likely impacts of local developments, road transport, other transport sources, industrial installations, commercial and domestic sources, and fugitive emissions.

The assessment has concluded that there are no new or significantly changed sources which could give rise to any potential exceedences outside the existing AQMA.

11.3 Progress with action plan

The council has completed phase 1 of the interchange project. This has provided improved linkages into the bus station from the city's ring road and has significantly reduced the amount of bus traffic within the town centre. Air quality within the town centre has subsequently improved and the number of locations exceeding the objectives within the town centre area has dropped from 18 as identified in the previous USA in 2009, to 4 in 2011.

The council is working closely with the regional West Midlands group authorities to develop a low emissions strategy policy for the West Midlands, which is intended to form the basis of future revisions to the action plan. A revised and updated action plan will be submitted along with the next progress report in 2013.

11.4 Proposed Actions

The Updating and Screening Assessment has confirmed that there are no new locations exceeding the air quality objectives therefore a detailed assessment is not required.

The Updating and Screening Assessment has confirmed that there are a no new locations where additional monitoring is required. Sites which are showing continued compliance with the objectives will be considered for closure at the end of the current year.

Wolverhampton City Council intends to submit the 2013 Progress Report as required by the Review and Assessment process.

12 References

(1) Local Air Quality Management – Technical Guidance LAQM.TG(09), Department for Environment, Food and Rural Affairs 2009.

(2) Technical Guidance: Screening Assessment for Biomass Boilers, AEA Energy & Environment 2008

(3) Air Quality Review & Assessment Updating and Screening Assessment Incorporating Stage 4 Assessment and Action Plan Progress Report 2009. Wolverhampton City Council.

(4) LAQM Tools; Local Air Quality Management website www.airquality.co.uk

(5) Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for laboratories and Users. Report to Defra and the Devolved Administrations ED48673043 Issue 1a Feb 2008.

Appendices

Appendix A: QA/QC Data

Diffusion Tube Bias Adjustment Factors

Diffusion tubes are supplied and analysed by Gradko International Ltd. and are prepared using 50%TEA in acetone. The tubes arrive from Gradko and are stored in a refrigerator prior to being labelled with a site and date code. The tubes are then exposed in accordance with the start and end dates for the national NO_2 survey. Following exposure the tubes are capped and immediately dispatched to Gradko for analysis.

The bias adjustment factor for the tubes and supplier have been obtained from the LAQM tools website, Review & Assessment database, Spreadsheet Version Number: 09/12, these are detailed below.

Factor from Local Co-location Studies

Triplicate tubes are exposed at the automatic monitoring stations in order to calculate a bias correction factor. The correction factor is applied to the yearly average to enable comparison with the annual NO_2 objective. The results from the co-location studies for 2011 are shown in the table below.

Prior to its closure in 2007 the Wolverhampton Centre AURN station was used for the co-location study. Since 2007 co-location tubes have been placed at the Lichfield Street and Stafford Road automatic stations. The factor applied to the data set is the mean bias adjustment factor from Table A1.1.

Table A1.1 Chemiluminescent v Diffusion Tube Values 2011 (µg/m^3)

Site	Mean	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	%
Automatic Monitor Intercomparison: Diffusion Tube Values µg/m^3														
Lichfield St	**37**	50	39	39	43	30	23	35	35	32	37	48	36	100
Lichfield St	**38**	59	38	38	36	25	27	40	33	32	41	48	33	100
Lichfield St	**40**	69	37	43	40	33	27	37	33	29	40	49	38	100
Mean		59.2	38.0	39.7	39.8	29.4	25.6	37.4	33.9	31.0	39.2	48.2	35.7	
Standard deviation		9.90	0.86	2.84	3.41	3.67	2.01	2.49	1.02	1.92	2.36	0.87	2.35	
Coefficient of variation		16.7	2.3	7.2	8.6	12.5	7.9	6.7	3.0	6.2	6.0	1.8	6.6	
Data quality		Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	
Stafford Road	**39**	55	32	40	39	35	37	37	39	37	33	45	42	100
Stafford Road	**39**	45	39	46	39	38	30	36	35	37	40	42	35	100
Stafford Road	**40**	47	38	41	36	37	36	40	35	41	38	45	42	100
Mean		49	36	42	38	37	35	38	37	39	37	44	40	
Standard deviation		5	4	3	2	2	4	2	2	2	3	1	4	
Coefficient of variation		11.1	10.5	8.0	4.0	4.3	11.3	5.8	6.1	6.2	9.0	3.3	10.1	
Data quality		Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	
Mean of triplicate tubes														
Lichfield St	**38**	59	38	40	40	29	26	37	34	31	39	48	36	100
Stafford Rd	**39**	49	36	42	38	37	35	38	37	39	37	44	40	100
Monthly Chemiluminescent Values														
Lichfield St	**36**	44	40	44	40	29	25	31	29	27	40	48	34	100
Stafford Rd	**34**	42	36	44	34	25	23	34	31	31	34	36	29	92
Ratios of diffusion Tube Values:Chemiluminescent values														
Lichfield St	**0.94**	0.74	1.06	1.11	1.01	0.97	0.97	0.82	0.84	0.86	1.02	0.99	0.96	
Stafford Rd	**0.85**	0.86	1.00	1.03	0.90	0.68	0.66	0.92	0.84	0.79	0.93	0.83	0.72	
Bias	**0.89**													

Discussion of Choice of Factor to Use

A comparison of the relevant bias adjustment factors is shown in Table A1.2 below. The national factors have been calculated using data from a number of authorities with tubes which will have been prepared and analysed in different batches and at different times.

The local bias adjustment factors are derived from triplicate co-located tubes exposed alongside an automatic analyser. These tubes are from the same batch as the measurement tubes and are handled, stored and analysed in the same way.

Table A1.2 National and local bias adjustment factors.

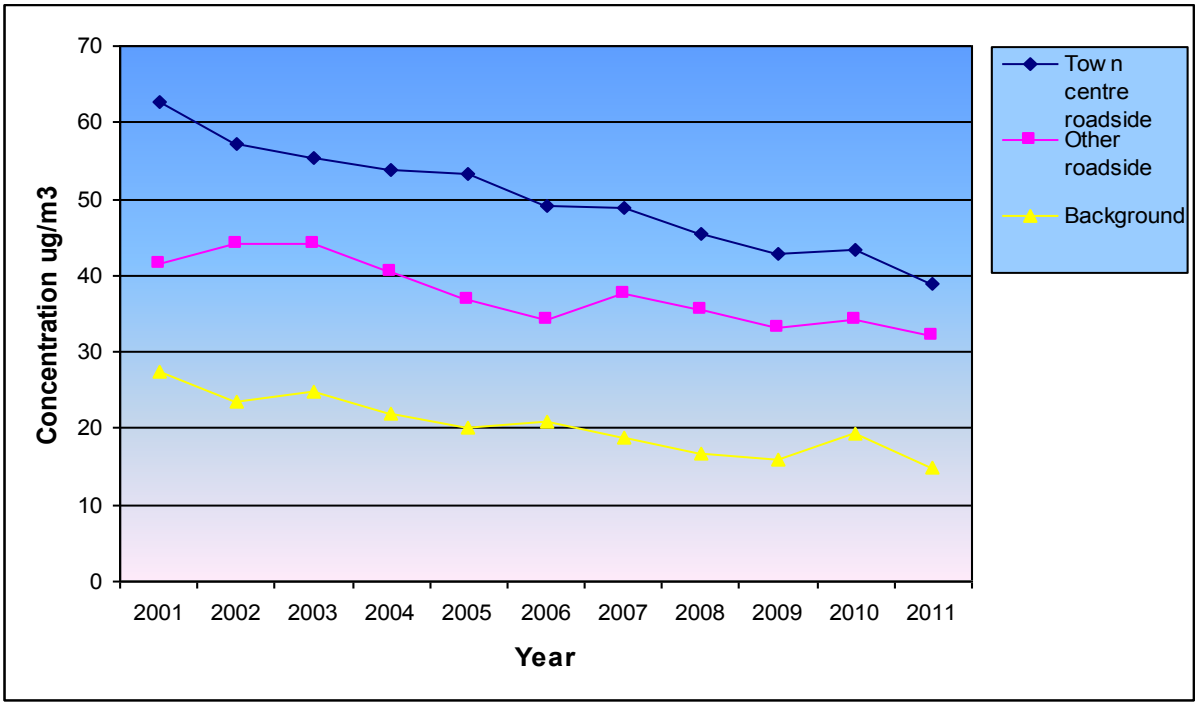
Year	National Bias Adjustment Factor	Local Bias Adjustment Factor
2001	1.45	1.01
2002	1.27	0.95
2003	1.11	0.97
2004	1.10	0.93
2005	1.10	1.00
2006	1.01	1.03
2007	0.99	0.93
2008	0.94	0.97
2009	0.97	1.08
2010	0.99	0.97
2011	0.94	0.89
Mean	1.10	0.98
Std	0.16	0.05

The locally derived bias adjustment factors indicate that the tubes correlate well with the automatic analysers throughout the period. The local data set shows a high degree of precision, the mean value is 0.98 and a standard deviation of 0.05, assuming a normal distribution.

The nationally derived bias adjustment factors prior to 2006 suggest that the tubes were significantly under reading, which is not our experience at Wolverhampton. This is particularly evident in 2001 and 2002 during which the tubes appeared to under read by 45% and 27% respectively. The mean value is 1.10 and a standard deviation of 0.16, assuming a normal distribution.

Trend data using both correction factors is presented in Figures A1.1 and A1.2. This shows that the national correction factor artificially raises the NO_2 concentrations at the start of the period, and produces an overall downward trend of between 10 and 20 $\mu g/m^3$ (Figure A1.1).

Figure A1.1 Annual mean NO_2 values using national bias adjustment factor.



The diffusion tube NO_2 concentrations corrected with the locally derived adjustment factors (Figure A1.2) remained relatively stable over the period. These correction factors produce trend data which is more consistent with the data from the automatic analysers (Figure A1.3).

Figure A1.2 Annual mean NO_2 values using local bias adjustment factor.

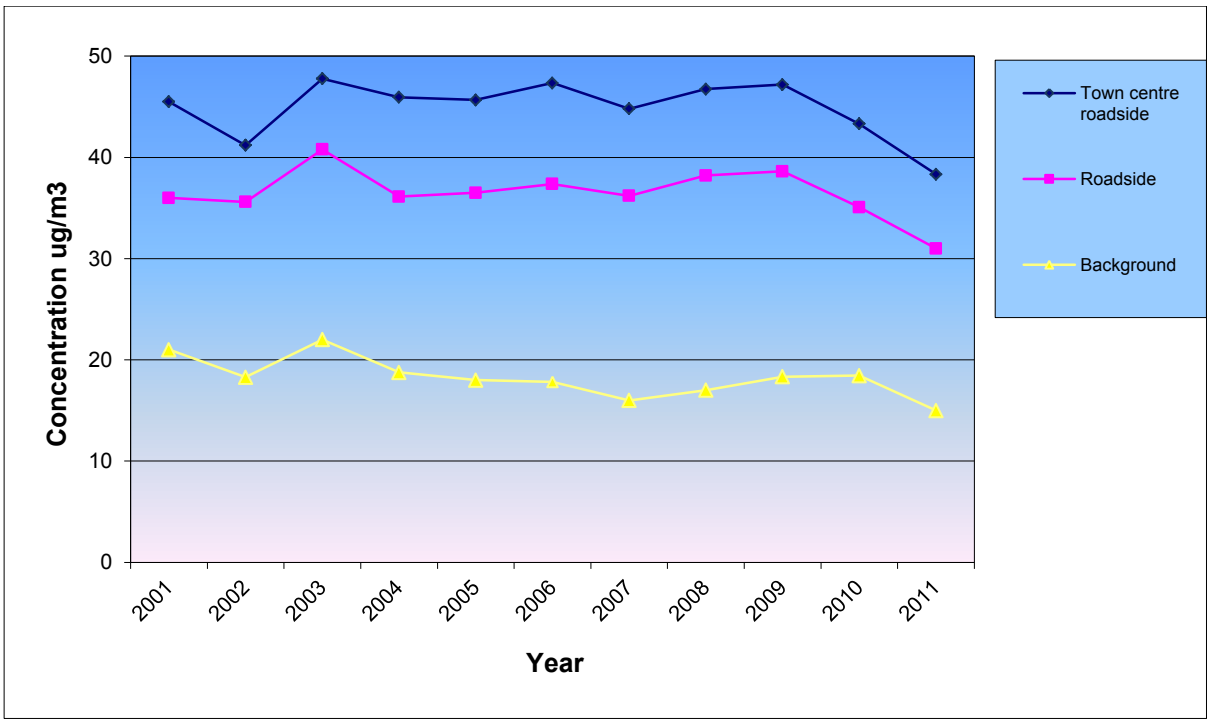
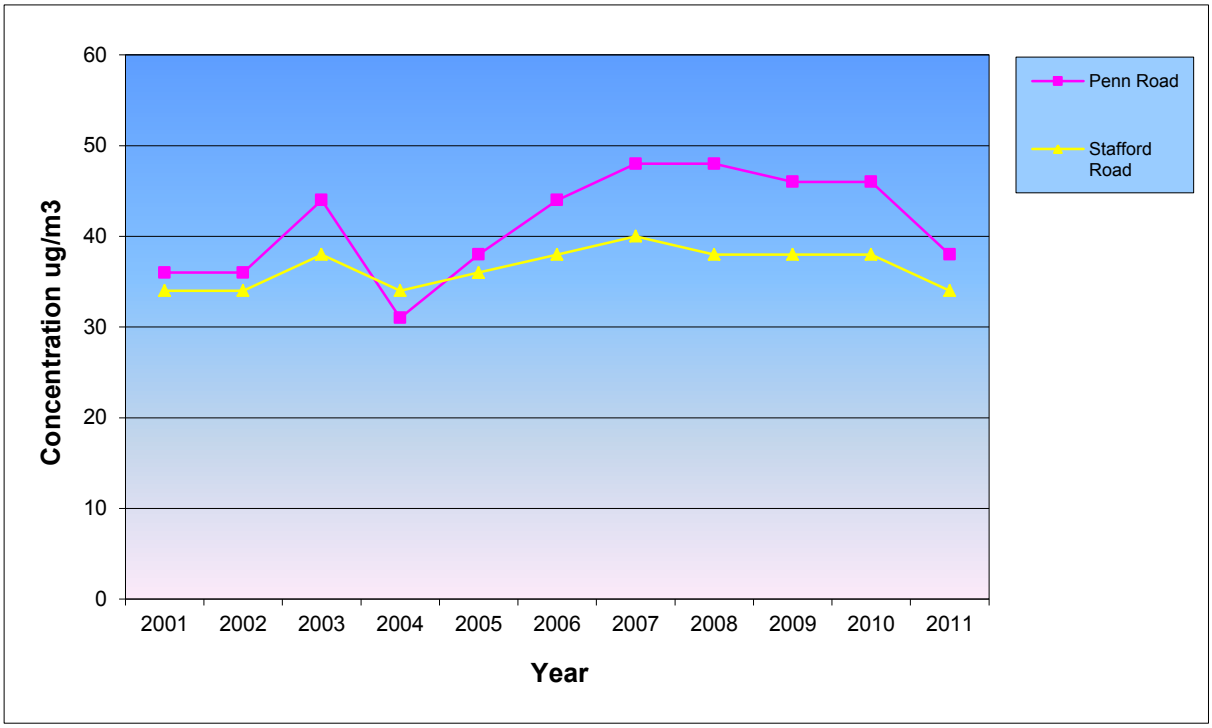


Figure A1.3 Annual mean NO_2 values automatic analysers.



A comparison of the diffusion tube data with the data from the automatic analysers shows that the locally corrected data provides better resolution and a clearer picture of NO_2 fluctuations and trends. Based on this assessment the local correction factors have been used to correct the diffusion tube data.

PM Monitoring Adjustment

Particle monitoring is carried out using Tapered Element Oscillating Microbalance (TEOM) analysers. Data for 2009, 2010 and 2011 has been corrected using the volatile correction model (VCM) as required by LAQM.TG(09). The VCM was not available prior to 2008, therefore pre 2008 data has been corrected by applying the 1.3 correction factor to the annual mean in accordance with the previous guidance in LAQM.TG(03).

Short-term to Long-term Data adjustment

Data capture for the HOR and STA9a non automatic NO2 diffusion tube sites was 58% during 2011. As this is below the minimum requirement of 75% data capture, the results have been adjusted to provide an estimated annual mean concentration in accordance with the method outlined in Box 3.2 of the guidance manual, using data

from the closest available continuous monitoring background sites. The correction factors for each site are calculated below.

Table A.1.3 Short-Term to Long-Term Monitoring Data Adjustment for diffusion tube site ref HOR

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
Birmingham Tyburn Rd	Background urban	34.4	31.7	1.085
Coventry Memorial Park	Background urban	17.2	16.4	1.049
Average				**1.067**

Table A.1.4 Short-Term to Long-Term Monitoring Data Adjustment for diffusion tube site ref STA9a

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
Birmingham Tyburn Rd	Urban Background	34.4	27.4	1.253
Coventry Memorial Park	Background urban	17.2	14.0	1.229
Average				**1.241**

QA/QC of automatic monitoring

The chemiluminescent monitors are calibrated on a daily basis using on site calibration gases. This involves feeding a zero air gas, followed by a span gas containing a known concentration of NO_2, through the analyser. A correction factor is then applied based on the analyser's response. The calibration reports are checked on a daily basis to check for drift and the correct application of the correction factor. Data is stored in both the raw and corrected form.

A site visit is made every month to change filters and carry out a manual calibration, which is checked against the automatic daily calibrations. Copies of the calibration reports, calibration gas logs and engineer's reports are retained on file.

All the sites are covered by a service contract provided by Enviro Technology Services plc (ET). The sites are serviced every 6 months by an ET service engineer in accordance with the manufacturer's instructions and warranty conditions. ET also provide a 48-hour call out response to cover breakdowns.

The aim is to achieve 90% data capture and in order to minimise the loss of data the procedures in box A1.4: of LAQM.TG(09) have been adopted.

Raw data is examined on a daily basis to screen out spurious and unusual measurements having regard to the recommendations in Box A1.6 of LAQM.TG(09).

QA/QC of diffusion tube monitoring

Diffusion tubes are supplied and analysed by Gradko International Ltd. in accordance with the procedures set out in the harmonisation document: "Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance". Gradko International Ltd is a UKAS and Workplace Analysis Scheme for Proficiency (WASP) accredited laboratory and is one of a number of laboratories which take part in the UK NO_2 diffusion tube survey, run by NETCEN.

The WASP scheme involves the use of artificially spiked diffusion tubes to test the analytical performance of the laboratory on a quarterly basis. A summary of the performance in rounds 105 - 113 covering 2009 to 2011 has been obtained from the

Local Authority Air Quality Support web site. The results indicate that Gradko's analytical procedures do not have any systematic sources of bias.

The precision data for the laboratory obtained from the Air Quality Review & Assessment helpdesk shows the results for the 2009, 2010 and 2011 studies as generally having good precision.

The tubes arrive from Gradko and are stored in a refrigerator prior to being labelled with a site and date code. The tubes are then exposed in accordance with the start and end dates for the national NO_2 survey. Following exposure the tubes are capped and immediately dispatched to Gradko for analysis.

Triplicate tubes are exposed at the chemiluminescent monitoring stations in order to calculate bias correction which is applied to the yearly average to enable comparison with the annual NO_2 objective. The data from the triplicate tubes covering the period of this report show good precision.

Appendix B: Road Traffic Data

Table B1.1. Roads with Daily Traffic Flows (AADT) > 5000 vehicles/day

Description		2008 AADT	2010 AADT	% change
Black Country Route at Porkets Bridge	PCR414	44046	46856	6
Stafford Road at West Street	PCR277	40763		
Ring Road St Patricks North of Broad Street	P6R17067	40693		
A449 Stafford Road North of West Street	AUTOPROGL7015	38762	38299	-1
A449 Stafford Road North of West Street	AUTOPROGWV04	38638	39341	2
Stafford Street at The Maltings	PCR4508	38168	41915	10
Ring Road St Georges at Bilston Street Island	P6R2955	37076		
Ring Road St Marks at Penn Road Island	P6R6730	36238		
Ring Road St Johns at Penn Road Island	P6R17066	35656		
Ring Road St Peters	WV23	33914	38443	13
Ring Road St Andrews at Birch Street	PCR2459	33563		
A41 Chapel Ash South of Lovatt Street	AUTOPROGL7040	33271	31085	-7
Willenhall Road at Noose Lane	PCR765	32986		
Ring Road St Andrews North of Bath Road	P6R2459	32937		
A449 Stafford Road North of Springfield Lane	AUTOPROGL7024	32901	34235	4
A4123 Birmingham New Rd South of Shaw Rd	AUTOPROGL7003	32765	27384	-16
A463 Black Country Route North of Hare St	AUTOPROGL7002	32377	33033	2
Penn Road at Penn Road Island	P6R447	31776		
Stafford Road/Springfield Lane/Service Road	TCR2670	31690	34150	8
A449 Penn Road North of Ablow Street	AUTOPROGWV14	30401	27815	-9
Stafford Road	CAR27030			
A449 Stafford Road North of Springfield Lane	AUTOPROGL7042	28848	30292	5
A4124 Wednesfield Road South of Woden Road	AUTOPROGL7017	25699	24195	-6
A454 Willenhall Road East of Colliery Road	AUTOPROGWV08	25671	24699	-4
Birmingham New Road at Needwood Drive	PCR17106	25626	25589	
Willenhal Road at Griffin Street Wv08	PCR1824	25297	24517	-3
A4039 Goldthorn Hill West of Park St South	AUTOPROGL7008	25165	23117	-8
Wednesfield Road at Lincoln Street Wv07	PCR3207	24536	21596	-12
Neachells Lane South of Strawberry Lane	AUTOPROGL7064	23943		
A460 Cannock Road East of Stafford Road	AUTOPROGL7016	23920	23315	-3
A4124 Wednesfield Road East of Sun Street	AUTOPROGWV07	23812	22201	-7
A41 Oxford Street East of Loxdale Street	AUTOPROGL7001	23765	23649	
A460 Cannock Road East of Cambridge Street	AUTOPROGWV05	23243	23870	3
Wellington Road at Bilston Campus Entrance	PCR27028	23059		
Broad Street Railway Side	P6R395	22951		
Cannock Road at Cambridge Street Wv05	PCR2248	22344	23955	7
Cannock Road at Bridge Street	PCR3988	22234		
Penn Road Near Bromley Place	PCR4509	22078		
Wellington Road	CAR27028	0		
Thompson Avenue at Silver Birch Road	PCR1307	21609		
Willenhall Road at Neachells Lane	TCN2230		32159	
Willenhall Road West of Deans Road	TCN2231		20970	
A454 Willenhall Road West of Deans Road	AUTOPROGL7005	21006	20970	
Waterloo Road at Molineux Alley	PCR17072	20902		
Ring Road St Patricks under Railway Drive	P6R3438	20564		
Bilston Road at Bilston Street Island	P6R6185	20207		
A4039 Parkfield Road East of Beacons Field Drive	AUTOPROGL7036	20198	19985	-1

A41 Bilston Road North of Jenner Street	AUTOPROGWV09	20194	20897	3
A4123 Birmingham Road North of Derry Street	AUTOPROGWV12	19729	20111	2
Merridale Road South of Merridale Lane	AUTOPROGWV16	19593	19352	-1
A459 Dudley Road North of Drayton Street	AUTOPROGWV13	19469	18670	-4
Waterloo Road Near Oxley Street	PCR3085	19440	16992	-13
Willenhall Road East of Hurstbourne Cr	PCR8401	19424		
Middle Cross at Bilston Street Island	P6R17069	19400		
A41 Bilston Road West of Eagle Street	AUTOPROGL7018	19387	18644	-4
Cannock Road South of Mill Lane	PCR1269	19303		
Neachells Lane Near Phoenix Road	PCR3612	19261	19161	-1
A449 Penn Road West of Hollybush Lane	AUTOPROGL7019	18812	18513	-2
A4039 Millfilds Road West of Ward Street	AUTOPROGL7004	18765	22790	21
A454 Compton Road East of Richmond Road	AUTOPROGWV17	18731	17559	-6
The Rock	TCN2216	17796		
Bradmore Road At Merridale Road (Vehicles)	PCR8193	17794		
Ring Road St Davids at Bilston Street Island	P6R17068	17527		
Codsall Rd/Lowlands Ave/Lower St/Malthouse La	TCR1837	17486		
Compton Rd W	TCR886	17419	16830	-3
A4124 Lichfield Road West of Peacock Avenue	AUTOPROGL7006	17311	15662	-10
Lichfield Road East at Stubby Lane	PCR1078	17189		
A459 Dudley Road North of Byrne Road	AUTOPROGL7039	16679	17874	7
A459 Wolverhampton Rd E South of Dovedale Rd	AUTOPROGL7009	16473	14713	-11
A41 Tettenhall Road South of Balfour Road	AUTOPROGL7020	16237	17335	7
A41 Tettenhall Road South of Balfourn Cr	AUTOPROGWV01	16237	17414	7
Vulcan Road South of Dale Street	AUTOPROGL7062	16224	14204	-12
Dudley Road Just South of Bromley Street Dtp	PCR3573	16054		
Wergs Road	TCN2216	16023		
Dudley Road/Ranelagh Road	TCR17071	15811		
New Hampton Road West-West Of Evans Street	AUTOPROGWV02	15806	15770	
B4163 Highfields Road East of Dudley Street	AUTOPROGL7048	15635	19945	28
Wobaston Road West of Pendeford Road	AUTOPROGL7087	15585	13566	-13
Wellington Road at Dover Road	PCR27029	15549		
Bilston Street at Bilston Street Island	P6R3214	15491		
Dudley Rd S	TCR17074	15404		
A460 Cannock Road South of Underhill Lane	AUTOPROGL7007	15207	17778	17
A41 Wellington Road West of Dover Street	CAR27029			
Dudley Rd S	TCR3639	15057		
Dudley Road/Hawthorne Road	TCR17074	15022		
Dudley Road S	PCR17065	15006		
Compton Road East of Westland Road Dtp	PCR2902	14869		
Dudley Road/Wanderers Avenue	TCR17107	14853		
Warstones Road South of Warstones Drive	AUTOPROGL7080	14814	11752	-21
Shaw Road	TCN2256	14772	13159	-11
Dudley Road/Knox Road	TCR3639	14647		
A4124 Lichfield Road South of Lyndale Drive	CAR27020			
Coalway Road/Windsor Avenue	TCR7391	14465	12680	-12
A4124 Lichfield Road West of Broad Lane North	CAR27022			
Dudley Rd S	TCR17071	14365		
A454 Bridgnorth Road West of Windmill Lane	AUTOPROGL7021	14278	14761	3
Bushbury Road/Church Street/Tudor Road	TCR1296	14203	13483	-5
Waterloo Road North of Oxley Street	CAR27023			
Broad Lanes South of Withy Road	AUTOPROGL7059	13936	13132	-6
A4124 Lichfield Rd East of Moathouse Lane East	CAR27021			

A41 Wergs Road West of Woodthorne Road	AUTOPROGL7022	13794	14134	2
Bridgenorth Road At The Holloway	PCR571A	13640		
New Hampton Road East East of Rugby Street	AUTOPROGL7084	13630	13763	1
Blackhalve Lane at Belton Avenue	PCR6995	13567		
Wergs Road at Danescourt Road	TCR17109	13549		
Lunt Road at Lonsdale Road	PCR3169	13330		
Bushbury Road South of Shawbury Road	AUTOPROGL7071	13198	14514	10
Wergs Rd S	TCR17109	13162		
Compton Rd E	TCR886	13075	12591	-4
Compton Rd W	TCR886	17419	16830	
Wergs Road Near Coppice Lane	PCR2977	12959		
Shaw RoadaAt Hinchcliffe Lane	PCR3398	12842		
Legs Lane/Underhill Lane/Bushbury Lane	TCR17117	12600		
Coalway Road	PCR8648	12348		
B4484 Amos Lane South of Bellamy Lane	AUTOPROGL7051	12104	12042	-1
Ladymoor Road At Bridge	PCR838	11918	12455	5
Birches Barn Road Just North of The Minster	PCR3637	11905	12722	7
Blackhalve Lane East of Cannock Road	PCR17001	11855		
Blackhalve Lane East of Cannock Road	PCR17001	11855		
Broad Lane South North of Birchfield Road	AUTOPROGL7065	11419	10692	-6
Coalway Road East of Beckminster Road	AUTOPROGL7079	11384	8153	-28
Linthouse Lane West of Springhill Road	AUTOPROGL7066	11380	9816	-14
Stow Heath Lane North of Bedford Street	AUTOPROGL7060	11307		
Underhill Lane Near The Talisman Public House	PCR7173	11263		
Lower Street	TCR17110	11244		
B4484 Waddens Brook Lane East of Vale Drive	AUTOPROGL7050	11122		
Moseley Road Just South Of Hill Road	PCR2234	11026		
Underhill Lane North of Highfield Avenue	AUTOPROGL7069	10710		
Broad Street Town Side	P6R3432	10649		
Under Hill Lane	TCR17117	10469		
Bushbury Lane North of Fordhouse Road	AUTOPROGL7075	10337		
Amos Lane 0-50m South of Cottage Close	PCR8234	10132		
Moseley Road West of Dilloway's Lane	AUTOPROGL7063	10035		
Blackhalve Lane	TCN2275	9932		
Wolverhampton Road East of New Cross Avenue	PCR17101	9928		
Craddock Street Just South of Jackson Street	PCR3622	9753		
Long Knowle Lane	TCN2275	9737		
Bushbury Lane South of Hellier Road	AUTOPROGL7071	9620	8983	-7
Mount Pleasant West of James Street	PCR17076	9503		
A4126 Spring Road North of Lanesfield Drive	AUTOPROGL7118	9488		
Craddock Street South of Dunstall Road	AUTOPROGL7083	9419		
Mount Pleasant Just East of Etruria Way	PCR17095	9067		
Bushbury Lane	TCR17117	8933		
Windmill Lane South of Castlecroft Lane	AUTOPROGL7085	8904		
Linthouse Lane North of Olinthus Avenue	AUTOPROGL7067	8843		
Blaydon Road North of Oxley Moor Road	PCR1338	8798		
The Holloway at Cygnet Close	PCR571A	8767		
Castlecroft Road near The Avenue	PCR17112	8668		
B4484 Willenhall Road West of St.Chad's Road	AUTOPROGL7049	8632		
Woodend Road	TCN1036	8630		
Broad Lane South South of Pool Hayes Lane	CAR27018			
Clark Road/Compton Road	TCR886	8532	8177	-4
Blaydon Road North of Emsworth Crescent	AUTOPROGL7082	8284		

Dovedale Road at Woodcross Street	PCR17065	8032		
Codsall Road 0-50m West of Knights Avenue	PCN3101	7951		
Church Street	TCR1296	7837		
Finchfield Lane Just North of Trysull Road	PCR2782	7774		
Griffiths Drive at Adey Road	PCR7075	7667		
Tudor Road	TCR1296	7616		
Upper Villiers South of Sunbeam Street	PCR2783	7560		
Bradley Lane East of Sterling Road	AUTOPROGL7058	7506		
Great Brickiln Street East of Ashland Street	AUTOPROGWV15	7440		
Finchfield Road East of Broad Lane	AUTOPROGL7052	7112		
Wightwick Bank South of Elmsdale	CAR27038			
Dovedale Road South of Ward Grove	AUTOPROGL7078	6839		
Proud's Lane North of Wassell Road	AUTOPROGL7061	6810		
Worcester Street at Penn Road Island	P6R3410	6784		
Dunstall Road North of Evans Street	AUTOPROGWV03	6722		
Wood Road North of Haywood Drive	AUTOPROGL7081	6719		
Wightwick Bank at Elmsdale	PCR2244	6670		
Primrose Lane North of Ruskin Road	AUTOPROGL7070	6572		
Steelhouse Lane South of Jenner Street	AUTOPROGWV10	6566		
Paget Road West of Hatton Road	CAR27042			
Old Fallings Lane South of Leacroft Avenue	PCR3588	6476		
Oaklands Road East of Lea Road	PCR27036	6171		
Lowlands Avenue	TCR1837	6144		
Peacock Avenue North of Lichfield Road	PCR3662	5923		
Goldthorn Avenue	PCR17084	5873		
Horseley Fields Traffic turning left into Corn Hill	P6R3041	5659		
Bradley Lane	PCR2575	5658		
Legs Lane West of Wentworth Road	AUTOPROGL7073	5582		
Pear Tree La/Blackhalve La/Long Knowle La	TCN2275	5528		

Table B2.2. Road with a proportion of buses and/or HGV's > 20% 2008

Description	Date	LGV Total	HGV Total	All vehicles Total	% HGV
Lichfield Street West Of Victoria Square	07/04/2009	1284	2112	3396	62
Queens Sq	04/03/2003	362	557	2859	58
Queen Sq Between Dudley St And Victoria St Dtp	09/10/2008	1102	1723	2994	58
Lichfield Street West	12/03/2003	380	550	2868	58
Queen Sq Between Dudley St And Victoria St	12/10/2006	1292	1645	3079	53
Lichfield Street East Of Dudley Street	08/11/2006	1256	1627	3046	53
Victoria Street	04/03/2003	165	177	1050	51
Lichfield Street West Of Princess Square	30/03/2009	1707	1451	3158	46
Cleveland Street	10/03/2003	267	141	1266	33
Market Street	12/03/2003	986	397	4239	28
Princess Sq	12/03/2003	1370	557	5952	28
Lichfield Street East	12/03/2003	278	1063	4059	26
Darlington Street	04/03/2003	1328	386	5238	22
Princess Street	12/03/2003	964	282	3897	22
Market Street North Of Castle Street	30/03/2009	3530	944	4474	21
Darlington Street	04/03/2002	1335	366	5259	21
A4124 Lichfield Rd East Of Moathouse Lane East	14/04/2008	8581	2213	10794	21
A4124 Lichfield Road South Of Lyndale Drive	14/04/2008	9033	2225	11258	20
A4124 Lichfield Road West Of Broad Lane North	14/04/2008	8996	2200	11196	20

Appendix C: Biomass Combustion Plants

ACT Office Furniture - Talbott T500	PM_{10}	$PM_{2.5}$	Annual mean NO_2	Hourly mean NO_2
Net thermal input kW	150	150	150	150
Stack height	10.5	10.5	10.5	10.5
Stack diameter	0.15	0.15	0.15	0.15
Building height	9.5	9.5	9.5	9.5
Effective stack height	1.6	1.6	1.6	1.6
Emission factor g/GJ	240	240	90	90
Emission rate, g/s	0.036	0.036	0.014	0.014
Background concentration,ug/m3	21.39018	13.61718	26.63956	26.63956
Background adjusted emission rate, g/s	0.0034	0.0032	0.001	0.004
Threshold emission rate g/s	0.0079	0.0243	0.0286	0.0226
Nomogram target emission (actual stack height)	0.0045	0.0045	0.014	0.06
Detailed assessment required	No	No	No	No

ASAN All Saints Rd - Talbott C4	PM_{10}	$PM_{2.5}$	Annual mean NO_2	Hourly mean NO_2
Net thermal input kW	400	400	400	400
Stack height	9	9	9	9
Stack diameter	0.25	0.25	0.25	0.25
Building height	9	9	9	9
Effective stack height	0	0	0	0
Emission factor g/GJ	240	240	90	90
Emission rate, g/s	0.096	0.096	0.036	0.036
Background concentration,ug/m3	17.20588	11.73858	25.03266	28.38951
Background adjusted emission rate, g/s	0.0065	0.0072	0.002	0.010
Threshold emission rate g/s	0.0119	0.0310	0.035	0.0385
Nomogram target emission (actual stack height)	0.0045	0.0045	0.014	0.06
Detailed assessment required	No	No	No	No

Goodridge Talbott - T300	PM_{10}	$PM_{2.5}$	Annual mean NO_2	Hourly mean NO_2
Net thermal input kW	100	100	100	100
Stack height	8.5	8.5	8.5	8.5
Stack diameter	0.15	0.15	0.15	0.15
Building height	7.5	7.5	7.5	7.5
Effective stack height	1.6	1.6	1.6	1.6
Emission factor g/GJ	240	240	90	90
Emission rate, g/s	0.024	0.024	0.009	0.009
Background concentration,ug/m3	19.57848	12.28195	21.36941	21.36941
Background adjusted emission rate, g/s	0.0019	0.0019	0.000	0.002
Threshold emission rate g/s	0.013	0.013	0.003	0.01
Nomogram target emission (actual stack height)	0.0034	0.0034	0.01	0.04
Detailed assessment required	No	No	No	No

Heath Town Flats - Fröling Lambdamat 1000	PM_{10}	$PM_{2.5}$	Annual mean NO_2	Hourly mean NO_2
Net thermal input kW	1271	1271	1271	1271
Stack height	67	67	67	67
Stack diameter	0.533	0.533	0.533	0.533
Building height	65	65	65	65
Effective stack height	3.2	3.2	3.2	3.2
Emission factor g/GJ (From LAQM TG(09))	76	76	150	150
Emission rate, g/s (E) (Unit converstion tool)	0.097	0.097	0.191	0.191
Background concentration,ug/m3 (G)	17.25898	11.67785	26.02187	26.02187
Background adjusted emission rate, g/s (E_A)	0.0066	0.0073	0.0136	0.0515
Target emission rate g/s from biomass calculator tool	0.0296	0.0800	0.084	0.0764
Detailed assessment required	No	No	No	No

Midland Joinery - Talbott T3A	PM_{10}	$PM_{2.5}$	Annual mean NO_2	Hourly mean NO_2
Net thermal input kW	100	100	100	100
Stack height	12	12	12	12
Stack diameter	0.15	0.15	0.15	0.15
Building height	8	8	8	8
Effective stack height	6.4	6.4	6.4	6.4
Emission factor g/GJ	240	240	240	90
Emission rate, g/s	0.024	0.024	0.024	0.009
Background concentration,ug/m3	21.56661	13.83902	26.20993	26.20993
Background adjusted emission rate, g/s	0.0023	0.0022	0.002	0.002
Threshold emission rate g/s	0.0222	0.0698	0.0862	0.0853
Nomogram target emission (actual stack height)	0.006	0.006	0.018	0.07
Detailed assessment required	No	No	No	No

Pendeford Farm - Biolyt 50 pellet boiler x2	PM_{10}	$PM_{2.5}$	Annual mean NO_2	Hourly mean NO_2
Net thermal input kW	100	100	100	100
Stack height	11	11	11	11
Stack diameter	0.15	0.15	0.15	0.15
Building height	10	10	10	10
Effective stack height	1.6	1.6	1.6	1.6
Emission factor g/GJ	66	66	150	150
Emission rate, g/s	0.007	0.007	0.015	0.015
Background concentration,ug/m3	17.99814	17.99814	18.15526	11.56019
Background adjusted emission rate, g/s	0.0005	0.0009	0.001	0.003
Threshold emission rate g/s	0.0104	0.0287	0.0467	0.0252
Nomogram target emission (actual stack height)	0.005	0.005	0.015	0.061
Detailed assessment required	No	No	No	No

Swift Furniture - Talbott T500	PM_{10}	$PM_{2.5}$	Annual mean NO_2	Hourly mean NO_2
Net thermal input kW	150	150	150	150
Stack height	10.5	10.5	10.5	10.5
Stack diameter	0.15	0.15	0.15	0.15
Building height	8.5	8.5	8.5	8.5
Effective stack height	3.2	3.2	3.2	3.2
Emission factor g/GJ	240	240	90	90
Emission rate, g/s	0.036	0.036	0.014	0.014
Background concentration,ug/m3	21.82321	13.90337	28.38951	28.38951
Background adjusted emission rate, g/s	0.0035	0.0032	0.001	0.004
Threshold emission rate g/s	0.0117	0.0380	0.0397	0.0385
Nomogram target emission (actual stack height)	0.0045	0.0045	0.014	0.06
Detailed assessment required	No	No	No	No

The Willows Energy Centre – KWB TDS Powerfire 150	PM_{10}	PM2.5	Annual mean NO_2	Hourly mean NO_2
Net thermal input kW	166	166	166	166
Stack height	7.4	7.4	7.4	7.4
Stack diameter	0.3	0.3	0.3	0.3
Building height	6.5	6.5	6.5	6.5
Effective stack height	1.44	1.44	1.44	1.44
Emission factor g/GJ	66	66	150	150
Emission rate, g/s	0.011	0.011	0.025	0.025
Background concentration,ug/m3	20.00000	20.00000	20.00000	11.56019
Background adjusted emission rate, g/s	0.0009	0.0022	0.001	0.006
Threshold emission rate g/s	0.0093	0.0111	0.0446	0.0299
Nomogram target emission (actual stack height)	0.0025	0.0025	0.0075	0.0075
Detailed assessment required	No	No	No	No

2013 Air Quality Progress Report for

Wolverhampton City Council

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

December, 2013

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Report Reference number	WCCPR2013
Date	December 2013

Executive Summary

This progress report has been produced as part of the on going process of the review and assessment of air quality to provide an update on local air quality management within the city of Wolverhampton.

The report presents monitoring data for the year 2012 and considers any new local developments which have taken place in the city since the previous Updating & Screening Assessment published in December 2012.

A review of emission sources has found that there have been no new industrial processes, or any other significant sources granted planning approval which could contribute to poor air quality.

A comprehensive review of all monitoring data gathered since the previous report has been carried out. Areas where the air quality objectives are not being met have been identified together with any significant trends.

Recent monitoring data has identified that there was a small increase in nitrogen dioxide and particle concentrations across the city in 2012 compared with 2011. This was caused by weather patterns during 2012 which hampered the dispersion of pollutants. A comprehensive review of sources of both pollutants has been carried out and there is no evidence to suggest that emissions have increased. The increase has resulted in 5 new locations within Wolverhampton which are exceeding the objective for nitrogen dioxide.

Despite this NO_2 concentrations have reduced along certain roads within the city centre and three sites which were exceeding the objectives are now compliant. This is a direct result of reducing the number of buses along the roads affected, brought about by the completion of phase 1 of the interchange project which has enabled buses to access the bus station directly from the ring road.

Wolverhampton City Council has concluded that a detailed assessment will not be required.

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Appendix A: QA:QC Data.

1 Introduction

1.1 Description of Local Authority Area

Located to the north of the West Midlands conurbation, Wolverhampton is on the edge of the Black Country, some 15 miles from the regional centre of Birmingham. Wolverhampton functions as a major centre within the Black Country and the northern part of the West Midlands.

The city covers an area of 26 square miles (6,880 hectares) and has a population of around 250,000 residents. Wolverhampton is primarily an urban area with the majority of the land use being residential and industrial. However, there are areas of green space, allotments, sports grounds, isolated pockets of countryside, small lakes and ponds and farm land which make up approximately 13% of the city. These provide a variety of habitats for a wide range of plant and animal species.

Wolverhampton benefits from good communications links, with access to the national motorway network provided by the M6 to the east, the M54 to the north, and the M6 Toll. Wolverhampton also has a mainline railway station, which provides direct trains to Birmingham, London, the West Country and the north. Proposals are currently underway to introduce a number of improvements to the railway station and its environs through the city Interchange project. Phase 1 of this has been completed with the opening of the new bus station and access road in 2011.

The two principal pollutants affecting local air quality are nitrogen dioxide (NO_2) and fine particles (PM_{10}). The major source of these pollutants is road traffic and there are a number of roads within the city where the air quality objective for NO_2 is being exceeded. These are primarily narrow congested streets within the town centre which have high levels of bus traffic. In response the Council declared the whole city an Air Quality Management Area (AQMA) in March 2005.

An Air Quality Action Plan (AQAP) has been prepared in conjunction with a cross service officer group and the local transport plan.

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedences are considered likely, the local authority must then 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.

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre μg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

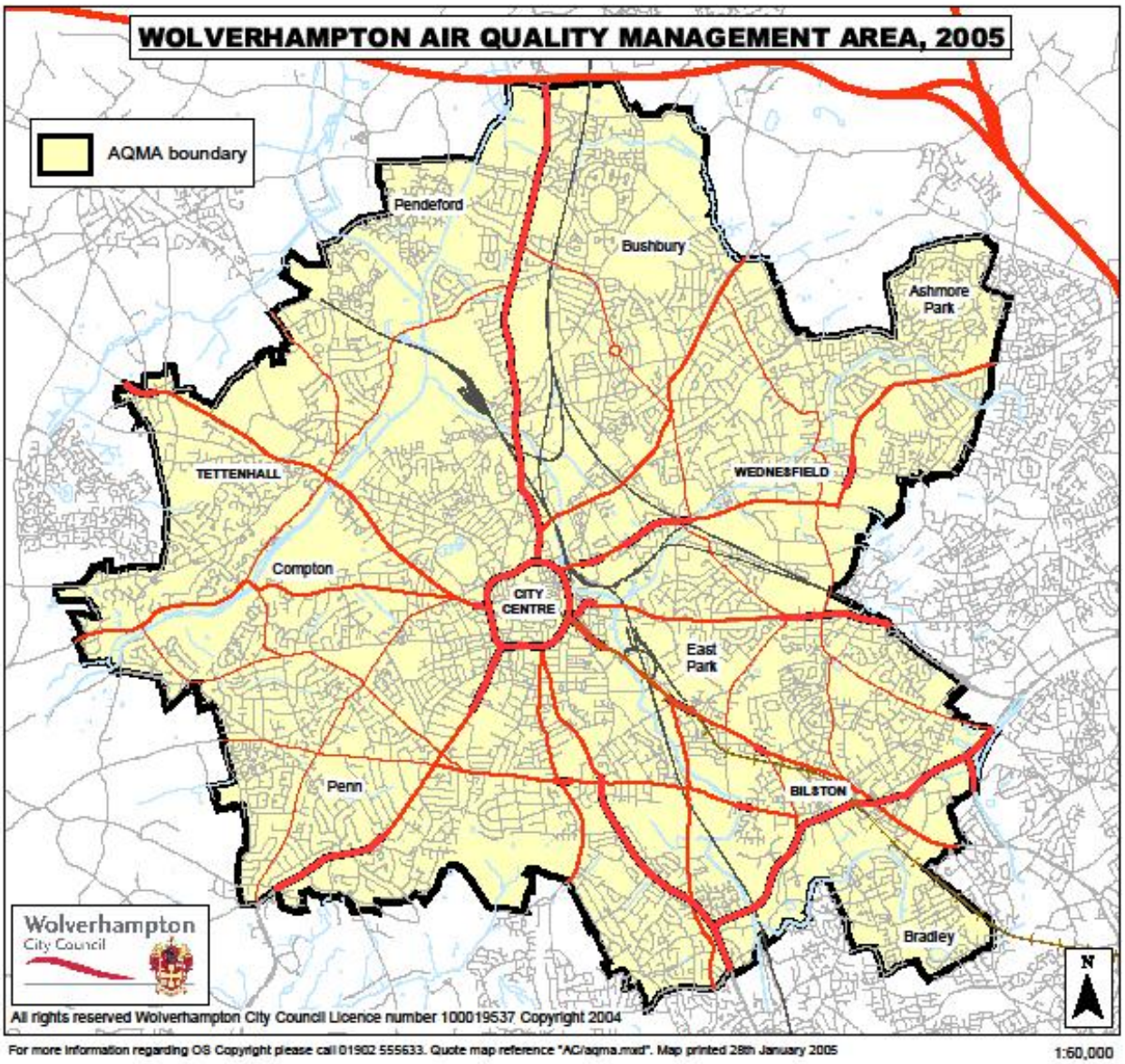
Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	5.00 µg/m^3	Annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Assessment	Exceedences	Conclusions and Recommendations
Stage 1 Report- March 1999	None	The report Identified 54 roads and 143 industrial processes within Wolverhampton which have the potential to be significant sources of pollution.
Stage 3 Report July 2001	None	A recommendation to carryout detailed investigations regarding the levels of NO_2 to confirm the prediction of the model. Further monitoring for NO_2 and PM_{10} is required along busy roads and roads with high flows of bus traffic
USA May 2003	Nitrogen dioxide, particles	Identified certain areas within the city where the objectives are likely to be exceeded. A Detailed Assessment of NO_2 and PM_{10} is required for parts of the city centre and two of the busiest junctions.
Detailed Assessment 2004	Nitrogen dioxide, particles	The Detailed Assessment confirmed that the objectives for NO_2 and PM_{10} were not being met along certain roads within the city centre and recommended the declaration of an AQMA
Section 83 (1) March 2005	Nitrogen dioxide, particles	Order designating the city of Wolverhampton an Air Quality Management Area (Appendix 1)
Annual Progress Report 2005	Nitrogen dioxide, particles	Confirmed conclusions of the Detailed Assessment and highlighted three new key developments for consideration in the 2006 USA
USA, Stage 4 Assessment and Action Plan 2006	Nitrogen dioxide, particles	Analysis of monitoring data showed that NO_2 concentrations had reduced from 2003 peak levels but continued to exceed the objectives at certain locations within the city. The levels of PM_{10} fell below the objectives during 2004 and 2005 and projected figures indicated a continuing downward trend. Nine new developments which required air quality assessments were considered. It was concluded that the developments would not result in the air quality objectives being exceeded. The action plan listed 23 actions and incorporated the Local Transport Plan into the long term air quality strategy.
Progress Report 2007	Nitrogen dioxide, particles	Monitoring data for 2006 showed the levels of NO_2 and PM_{10} increased contrary to the projected concentrations contained in the 2006 USA. Parts of the city Centre and certain busy road junctions continue to exceed the objectives for NO_2 and PM_{10}. There have been no new industrial processes or any other significant developments which could contribute to poor air quality since the 2006 USA.
Progress Report 2008	Nitrogen dioxide, particles	Levels of NO_2 and PM_{10} remain stable. There have been no new industrial processes or any other significant developments which could contribute to poor air quality since the 2006 USA.
USA, Stage 4 Assessment and Action Plan 2009	Nitrogen dioxide	There are no new or significantly changed sources which could give rise to any potential exceedences outside the existing AQMA and therefore, it is not necessary to proceed to a Detailed Assessment for any of the pollutants listed in Table 1.1 Additional monitoring, or changes to the existing monitoring programme is not required.
USA 2012	Nitrogen dioxide	Monitoring data for 2011 has identified that air quality improved across the city during 2011. This has resulted in a reduction in the number of areas within Wolverhampton which are exceeding the objectives. Wolverhampton City Council has concluded that a detailed assessment will not be required.

Figure 1.1 Map of AQMA Boundary



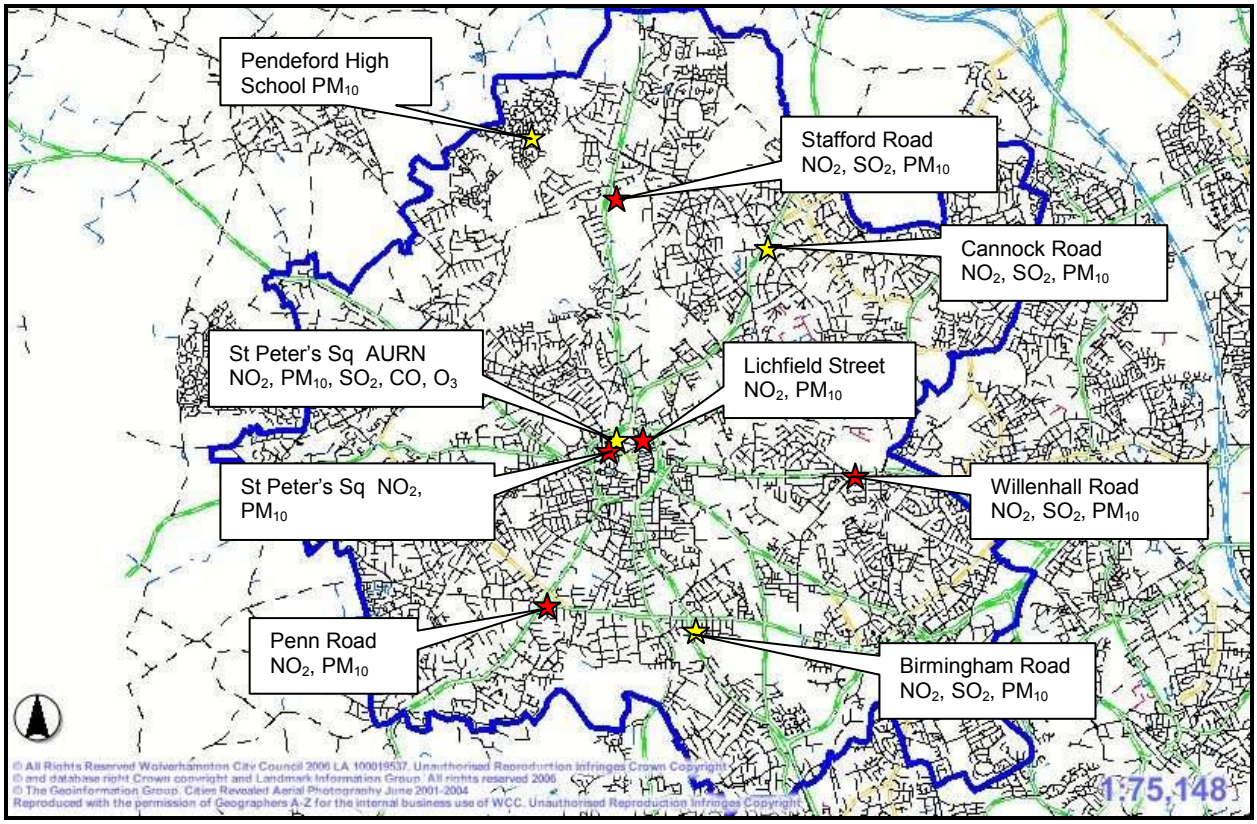
2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Wolverhampton Council operates 5 fully automatic monitoring stations, the locations of which are shown in Figure 2.1 below. These sites have been chosen to represent the worst case locations and cover the main arterial roads which link the city with major regional trunk roads and motorways. Details of the sites are given in Table 2.1.

Figure 2.1 Location of Automatic Monitoring Sites



Fixed stations are located on the A449 Stafford Road to the north which links with the M54, the A449 Penn Road to the south, and Lichfield Street which was the main access road into the bus station and has a high flow of bus traffic.

The Council also operates a mobile monitoring station which is currently located on the A454 Willenhall Road, a main link to the M6 and Walsall. Prior to this, the mobile station was located on the A4123 Birmingham New Road and the A460 Cannock Road.

Since the previous USA a new site has been established at St Peter's Square to replace the Wolverhampton centre AURN station which closed towards the end of 2008. This site houses a new NOx analyser and the PM_{10} monitor relocated from Pendeford High School. The site is 30m from the city ring road and is classified as an urban background location.

The site at Pendeford High School was a background location which was established in 2001. The annual mean PM_{10} values were consistently below the objectives and have shown little variation over the last 10 years. Consequently it was decided to close the site at the end of 2011 and relocate the PM_{10} monitor to St Peter's Square, which is more representative of background concentrations within the city centre.

Table 2.1 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Active sites											
A1	Lichfield Street	Roadside	391647	298784	2.5	NO_2 PM_{10}	Yes	Chemiluminescent TEOM	Yes (2m)	2.5m	Yes
A2	Penn Road	Roadside	390374	296775	2.5	NO_2 PM_{10}	Yes	Chemiluminescent TEOM	Yes (3.5m)	5m	Yes
A4	Stafford Road	Roadside	391261	302199	2.5	NO_2 SO_2 PM_{10}	Yes	Chemiluminescent UV Fluorescence TEOM	Yes (6.5m)	8.5m	Yes
A5	Willenhall Road	Roadside	394754	298429	2.5	NO_2 SO_2 PM_{10}	Yes	Chemiluminescent UV Fluorescence TEOM	Yes (3m)	10m	Yes
A9	St Peter's Square	Urban Background	390740	302692	2.5	NO_2 PM_{10}	Yes	Chemiluminescent TEOM	No	30m	No

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Closed sites											
A3	Pendeford High School	Background	390740	302692	2.5m	PM_{10}	Yes	TEOM	No	180m	No
A6	Cannock Road	Roadside	393030	300824	2.5m	NO_2 SO_2 PM_{10}	Yes	Chemiluminescent UV Fluorescence TEOM	Yes (11m)	6m	Yes
A7	Birmingham Road	Roadside	392264	296546	2.5m	NO_2 SO_2 PM_{10}	Yes	Chemiluminescent UV Fluorescence TEOM	Yes (3m)	6m	Yes
A8	St Peter's Square AURN	Urban Centre	391357	298939	2.5m	NO_2 SO_2 PM_{10} CO O_3	Yes	Chemiluminescent UV Fluorescence TEOM	No	30m	No

2.1.2 Non-Automatic Monitoring Sites

To complement the automatic sites NO_2 sampling is also carried out using passive diffusion tubes which are supplied and analysed by Gradko. The council has tubes at 54 locations around the city; these are detailed in Table 2.2.

The sites represent a combination of background, intermediate, and roadside locations intended to reflect the worst case situation where the general public are likely to be exposed.

Following the 2001 Stage 3 report a number of roads were designated as intensive survey areas (ISA's). The roads which have been targeted are the main arterial routes into the city centre and those streets which are narrow and congested or have a high proportion of heavy duty vehicles (HDV's). A total of 5 diffusion tubes have been located in a "W" formation along each of these roads.

Wherever possible, diffusion tubes are located on the façades of residential property. Where this is not possible tubes are attached to lampposts or other suitable street furniture.

Table 2.2 Details of Non- Automatic Monitoring Sites

Site ID	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Active sites										
BIL1	Roadside ISA	395057	296541	3m	NO_2	Y	N	Y(0m)	4m	Y
BIL2	Roadside ISA	395085	296475	3m	NO_2	Y	N	Y(0.5M)	4.5m	Y
BIL3	Roadside ISA	395102	296495	3m	NO_2	Y	N	N	10m	Y
BIL4	Roadside ISA	395117	296454	3m	NO_2	Y	N	Y(0m)	2.5m	Y
LIC1	Roadside ISA	391698	298776	3m	NO_2	Y	N	N	3.5m	Y
LIC2	Roadside ISA	391508	298744	3m	NO_2	Y	N	Y(0m)	3m	Y
LIC3	Roadside ISA	391620	298772	3m	NO_2	Y	N	N	6m	Y
LIC4	Roadside ISA	391643	298786	3m	NO_2	Y	Y	Y(1.5m)	1.5m	Y
LIC5	Roadside ISA	391643	298786	3m	NO_2	Y	Y	Y(1.5m)	1.5m	Y
LIC6	Roadside ISA	391643	298786	3m	NO_2	Y	Y	Y(1.5m)	1.5m	Y
LIC7	Roadside ISA	391019	296671	3m	NO_2	Y	N	N	5m	Y
LIC8	Roadside ISA	391454	298733	3m	NO_2	Y	N	N	3m	Y
LIC9	Roadside ISA	390375	296775	3m	NO_2	Y	N	Y(0m)	3m	Y
PIP1	Roadside ISA	391768	298662	3m	NO_2	Y	N	N	2m	Y
PIP2	Roadside ISA	391794	298560	3m	NO_2	Y	N	N	4m	Y
PRI1	Roadside ISA	391548	298940	3m	NO_2	Y	N	N	3m	Y
PRI2	Roadside ISA	391566	298795	3m	NO_2	Y	N	Y(0m)	3m	Y
PRI3	Roadside ISA	391607	298745	3m	NO_2	Y	N	Y(0m)	4.5M	Y
PRI4	Roadside ISA	391581	298686	3m	NO_2	Y	N	N	5m	Y

Site ID	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
PRI5	Roadside ISA	391588	298612	3m	NO_2	Y	N	N	2.5m	Y
QUE1	Roadside ISA	391607	298652	3m	NO_2	Y	N	Y(0m)	2.5m	Y
QUE2	Roadside ISA	391622	298639	3m	NO_2	Y	N	N	4.5m	Y
QUE3	Roadside ISA	391662	298665	3m	NO_2	Y	N	Y(0m)	2.5m	Y
QUE4	Roadside ISA	391707	298660	3m	NO_2	Y	N	N	4.5m	Y
STA1	Roadside ISA	391377	299818	3m	NO_2	Y	N	Y(2m)	2m	Y
STA5	Roadside ISA	391261	302199	3m	NO_2	Y	Y	Y(6.5m)	8.5m	Y
STA6	Roadside ISA	391261	302199	3m	NO_2	Y	Y	Y(6.5m)	8.5m	Y
STA7	Roadside ISA	391261	302199	3m	NO_2	Y	Y	Y(6.5m)	8.5m	Y
STA9	Roadside ISA	391527	303350	3m	NO_2	Y	N	Y(8m)	3.5m	Y
STA9A	Roadside ISA	391536	303348	3m	NO_2	Y	N	Y(0m)	7m	Y
WIL1	Roadside ISA	394266	298438	3m	NO_2	Y	N	Y(14.5m)	14.5m	Y
WIL2	Roadside ISA	394712	298428	3m	NO_2	Y	N	Y(0m)	6.5m	Y
WIL3	Roadside ISA	394754	298429	3m	NO_2	Y	N	Y(1m)	10m	Y
WIL4	Roadside ISA	394754	298429	3m	NO_2	Y	N	Y(1m)	10m	Y
WIL5	Roadside ISA	394754	298429	3m	NO_2	Y	N	Y(1m)	10m	Y
BRI	Roadside	388182	298782	3m	NO_2	Y	N	Y(0m)	11m	Y
BRO	Roadside	391676	298865	3m	NO_2	Y	N	Y(5m)	5.5m	Y
CAN	Roadside	393008	300867	3m	NO_2	Y	N	Y(7.5m)	6.5m	Y
CLE	Roadside	391485	298348	3m	NO_2	Y	N	N	5m	Y

Site ID	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
CUL	Roadside	393371	297403	3m	NO_2	Y	N	Y(0m)	2.5m	Y
DUD	Roadside	391541	297267	3m	NO_2	Y	N	Y(1m)	3.5m	Y
HOR	Roadside	392115	298608	3m	NO_2	Y	N	Y(0.5)m	2.7m	Y
NEA	Roadside	394717	299894	3m	NO_2	Y	N	Y(4.5m)	2m	Y
OXF	Roadside	395384	296293	3m	NO_2	Y	N	Y(0m)	3.2m	Y
PAR	Roadside	392306	296547	3m	NO_2	Y	N	Y(10.3m)	2.7m	Y
TET	Roadside	389297	299886	3m	NO_2	Y	N	Y(3.2m)	3.2m	Y
TRI	Roadside	395540	296479	3m	NO_2	Y	N	Y(-1m)	11m	Y
WAT	Roadside	391134	298877	3m	NO_2	Y	N	N	3m	Y
WOL	Roadside	394031	297172	3m	NO_2	Y	N	Y(4m)	2m	Y
PRO	Intermediate	394633	296089	3m	NO_2	Y	N	N	28m	N
SPS	Intermediate	391357	298937	3m	NO_2	Y	N	N	30m	N
COL	Background	395855	300586	3m	NO_2	Y	N	N	48m	N
COLQ	Background	395855	300586	3m	NO_2	Y	N	N	48m	N
MAR	Background	390705	302736	3m	NO_2	Y	N	N	165m	N
WAR	Background	389132	296755	3m	NO_2	Y	N	N	50m	N
WRE	Background	392090	296095	3m	NO_2	Y	N	N	50m	N

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide (NO_2)

Automatic Monitoring Data

The annual mean concentrations from the automatic monitoring stations are presented in Table 2.3, exceedences of the objectives are highlighted in red.

Table 2.3 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2012 %	Annual mean concentrations (distance corrected) μg/m^3		
				2010	2011	2012
A1	Lichfield Street	Y	99	40	36	**46**
A2	Penn Rd	Y	51	**46**	38	**43**[1]
A4	Stafford Rd	Y	97	38	34	31
A5	Willenhall Rd	Y	99	**46**	38	**44**
A8	St Peter's Sq	Y	85	No result	No result	32

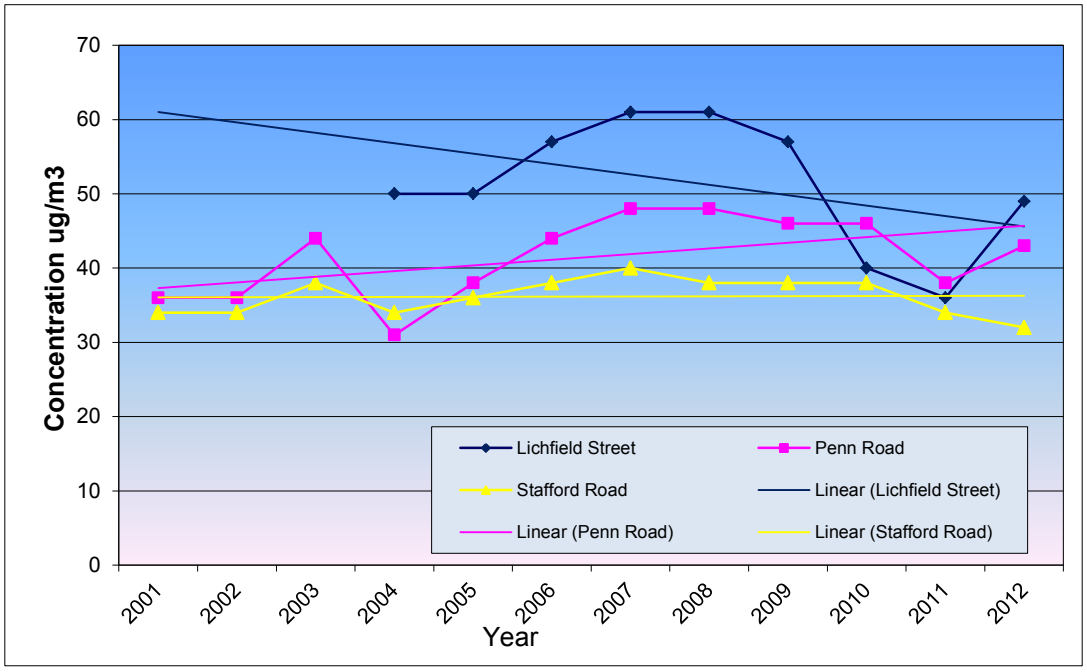
[1] Annualised data (Appendix A)

The yearly mean NO_2 concentrations from the longest running automatic monitoring stations are presented in Figure 2.2.

The long term trend at Penn Road indicates an overall increase in NO_2 concentrations over the last 11 years. Peak concentrations occurred in 2007/8 and since then there has been a reduction in NO_2, although the 2012 mean remains above the 2001 level.

The trend graph for Stafford Road shows that NO_2 levels have remained fairly stable over the last 11 years. There was a small increase in NO_2 concentrations between 2001 and 2007 followed by a gradual decrease, current levels are now 2 μg/m^3 below the 2001 concentration.

Figure 2.2 Trends in Annual Mean NO_2 Concentrations Measured at Automatic monitoring Sites



Lichfield Street is within the city centre and prior to 2010 was one of the main access routes into the bus station. The levels of NO_2 in Lichfield Street before 2010 were considerably higher than at other roadside locations due to the number of buses travelling along the road.

In 2010 Lichfield Street was closed to traffic during the bus station redevelopment project which resulted in a large decrease in the levels of NO_2. The project was completed in the summer of 2011 and the number of buses now using Lichfield Street has been reduced significantly. The levels of NO_2 remained below the objective in 2011 and then increased in 2012, a trend which occurred at other road side sites across the city. This increase was higher in Lichfield Street than at other roadside sites in the city and is due in part to artificially low levels of NO_2 in 2010 and 2011 caused by the closure of the road for part of that period, and favourable weather conditions during 2011 which helped disperse emissions. It is anticipated that NO_2 concentrations will stabilise at a level below the pre 2010 level.

Table 2.4 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2012 %	Number of Exceedences of hourly mean (200 µg/m^3)		
				2010	2011	2012
A1	Lichfield Street	Y	99	0	1	1
A2	Penn Rd/Goldthorne Hill	Y	51	0	0	1
A4	Stafford Rd/Church Rd	Y	97	0	0	0
A5	Willenhall Rd/Neachells La	Y	99	4	0	5
A8	St Peter's Sq	Y	85	No result	No result	0

A comparison against the 1-hour mean objective (Table 2.4) shows that exceedences of the hourly mean object were below the allowed 18 exceedences per year at all monitoring sites. The number of hourly means above 200 µg/m3 at the Willenhall Rd site increased to 5 during 2012. A pollution episode which occurred between the 13th and 14th January 2012 accounted for 4 of these exceedences. The dispersion of pollutants was hampered during this period by low temperatures, high pressure and low wind speeds (less than 5mph). This event was picked up at the other automatic monitoring stations although NO_2 concentrations only exceeded the hourly objective at the Willenhall Road site.

Diffusion Tube Monitoring Data

Diffusion tube results for 2010, 2011 and 2012 are shown in Table 2.5. The annual average for each site is presented as the bias corrected measured value, corrected for distance to the nearest relevant receptor in accordance with the procedure detailed in Box 2.3 of technical Guidance LAQM.TG(09). Exceedences of the annual mean objective value are highlighted in red.

The bias correction is obtained from the co-location of triplicate tubes alongside the Stafford Road and Lichfield Street automatic monitoring stations (see Appendix A).

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA	% Data capture 2012	Annual mean concentration µg/m^3 (adjusted for bias and distance)		
				2010 (Bias 0.97)	2011 (Bias 0.89)	2012 (Bias 1.05)
BIL1	Lichfield St, Bilston	Y	100	**45**	37	**42**
BIL2	Lichfield St, Bilston	Y	100	37	32	34
BIL3	Lichfield St, Bilston	Y	75	36	33	**47**[2]
BIL4	Lichfield St, Bilston	Y	100	38	33	37
LIC1	Lichfield St	Y	100	38	33	**42**
LIC2	Lichfield St	Y	100	**46**	**45**	**46**
LIC3	Lichfield St	Y	100	**41**	36	**47**
LIC4[1]	Lichfield St	Y	97	40	32	40
LIC7	Lichfield St	Y	100	39	33	40
LIC8	Lichfield St	Y	100	37	31	36
LIC9	Lichfield St	Y	100	**41**	34	**47**
PIP1	Pipers Row	Y	83	**42**	37	**46**
PIP2	Pipers Row	Y	100	**43**	35	38
PRI1	Stafford St	Y	92	**42**	39	39
PRI2	Princess Sq	Y	100	**44**	38	**41**
PRI3	Princess St	Y	100	39	32	32
PRI4	Princess St	Y	100	**49**	**48**	40
PRI5	Princess St	Y	100	**42**	35	35
QUE1	Queen St	Y	100	**43**	36	32
QUE2	Queen St	Y	75	**46**	**41**	39[2]
QUE3	Queen St	Y	100	**55**	**46**	36
QUE4	Queen St	Y	100	**44**	41	37
STA1	Stafford Rd	Y	100	33	28	30
STA3	Stafford Rd	Y	NA	33	Closed	Closed
STA4	Stafford Rd	Y	NA	29	Closed	Closed
STA5[1]	Stafford Rd	Y	97	37	34	38
STA8	Stafford Rd	Y	NA	29	Closed	Closed
STA9	Stafford Rd	Y	75	No result	**47**	**45**[2]
STA9A	Stafford Rd	Y	100	38	31	35
TEM1	Temple St	Y	NA	34	Closed	Closed
TEM2	Temple St	Y	NA	30	Closed	Closed
TEM3	Temple St	Y	NA	32	Closed	Closed
WIL1	Willenhall Rd	Y	92	26	23	27
WIL2	Willenhall Rd	Y	100	**42**	36	39
WIL3[1,]	Willenhall Rd	Y	100	37	30	34
PAR	Birmingham Rd	Y	92		31	36
BRI	Bridgnorth Rd	Y	100	27	21	22
BRO	Broad St	Y	100	**47**	**44**	**45**
CAN	Cannock Rd	Y	100	31	28	30
CLE	Cleveland St	Y	75	36	31	32[2]
CUL	Culwick St	Y	100	29	23	26
DUD	Dudley Rd	Y	92	30	26	27
HOR	Horseley Fields	Y	100		36[2]	36
NEA	Neachells Lane	Y	100	26	22	24
OXF	Oxford Street	Y	100		25	31
TET	Tettenhall Road	Y	100	**41**	38	39
WAT	Waterloo Rd	Y	92	37	30	35
WOL	5 Wolsley Rd	Y	100	26	19	20
PRO	Prosser St	Y	92	27	25	27
SPS	St Peter's Sq	Y	100	28	23	26
TRI	Trinity St	Y	100	30	24	25
COL	Coleman Ave	Y	100	20	16	18
MAR	Marsh Lane	Y	75	17	13	18[2]
WAR	Warstones Rd	Y	100	17	14	15
WRE	W'ton Rd East	Y	100	20	15	17

[1] Mean of triplicate tubes

[2] Annualised data (Appendix A)

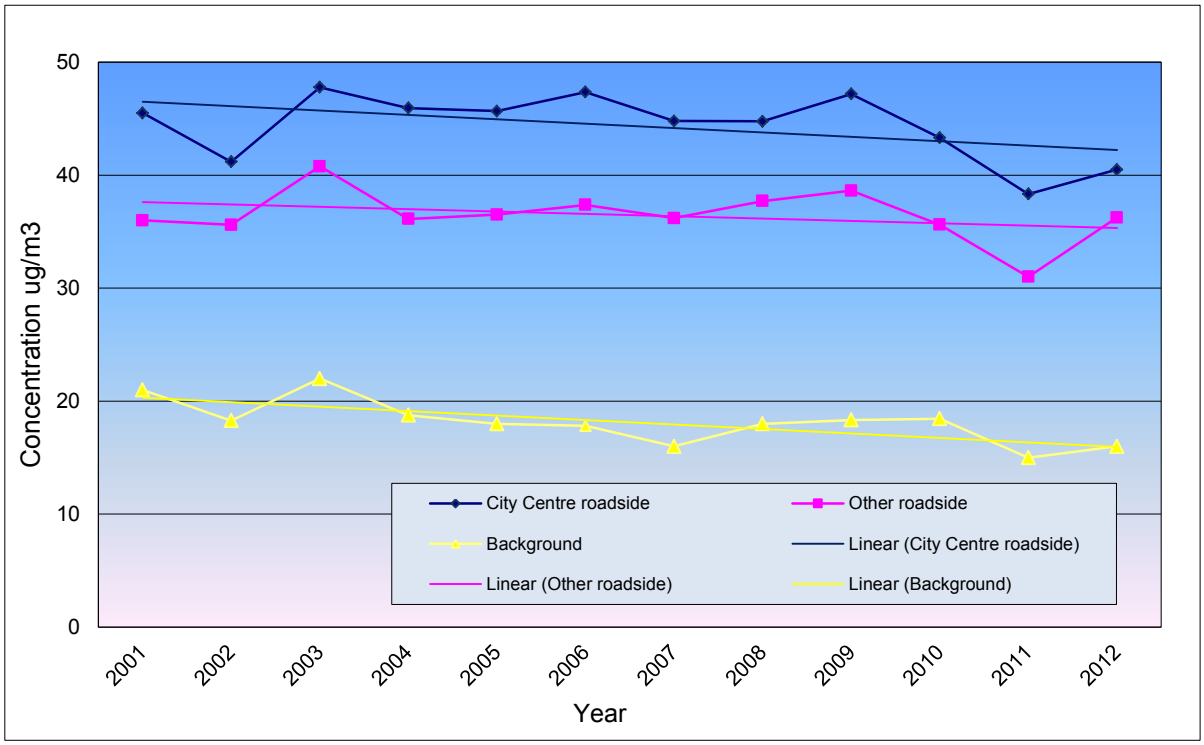
Table 2.6 provides a summary of the results from the intensive survey areas, the remaining roadside tubes and the background tubes for 2010, 2011 and 2012. The results are presented as the annual mean concentration calculated from individual tubes located along each particular road and site type corrected for bias and distance.

The data collected from the automatic monitoring stations and the diffusion tube sites has identified that annual mean NO_2 concentrations in 2012 increased at the majority of locations compared to the 2011 results. This increase was caused by the particular weather conditions during the year which hampered dispersion of pollutants rather than any increase in emissions.

Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes: ISA, Roadside, Intermediate and Background Sites

Location	Within AQMA	Annual mean concentration µg/m^3 (adjusted for bias and distance)		
		2010 (Bias 0.97)	2011 (Bias 0.89)	2012 (Bias 1.05)
Lichfield St, Bilston	Y	39	34	39
Lichfield St, East of Princess Sq	Y	40	34	**43**
Lichfield St, West of Princess Sq	Y	**41**	37	**41**
Princess St/Stafford St	Y	**43**	38	37
Queen St	Y	**47**	**41**	35
Stafford Rd	Y	33	31	36
Willenhall Rd	Y	35	30	34
Pipers Row	Y	**42**	36	**41**
Temple St	Y	32	Discontinued	
Roadside sites	Y	33	29	31
Intermediate sites	Y	28	24	26
Background sites	Y	19	15	16

Figure 2.3 Trends in Annual Mean NO_2 Concentrations at Diffusion Sites



The trend data (Fig 2.3) shows that, despite an increase in 2012, there has been an overall reduction in NO_2 at the diffusion tube sites over the past 11 years.

2.2.2 Particulate Matter (PM_{10})

A summary of the most recent TEOM data from the automatic monitoring stations is presented in Tables 2.7 and 2.8 . The data has been corrected using the King's College volatile correction model (VCM) in accordance with technical guidance document LAQM.TG(09).

Table 2.7 Results of Automatic Monitoring for PM_{10}: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2012 %	Annual mean concentrations (µg/m^3)		
				2010	2011	2012
A1	Lichfield Street	Y	98	21	23	20
A2	Penn Road	Y	52	23	25	22*
A3	St Peter's Car Park	Y	92			19
A4	Stafford Road	Y	98	22	23	21
A5	Willenhall Road	Y	83	21	23	21

* Annualised data (Appendix A)

Table 2.8 Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2010 %	Number of Exceedences of hourly mean (50 µg/m^3) *If data capture < 90%, include the 90th %ile of hourly means in brackets.*		
				2010	2011	2012
A1	Lichfield Street	Y	98	2	16	7
A2	Penn Road	Y	52	0	15	8*
A3	Pendeford High School	Y	92	0	7	9
A4	Stafford Road	Y	98	0	11	11
A5	Willenhall Road	Y	83	0	14	6

* Annualised data (Appendix A)

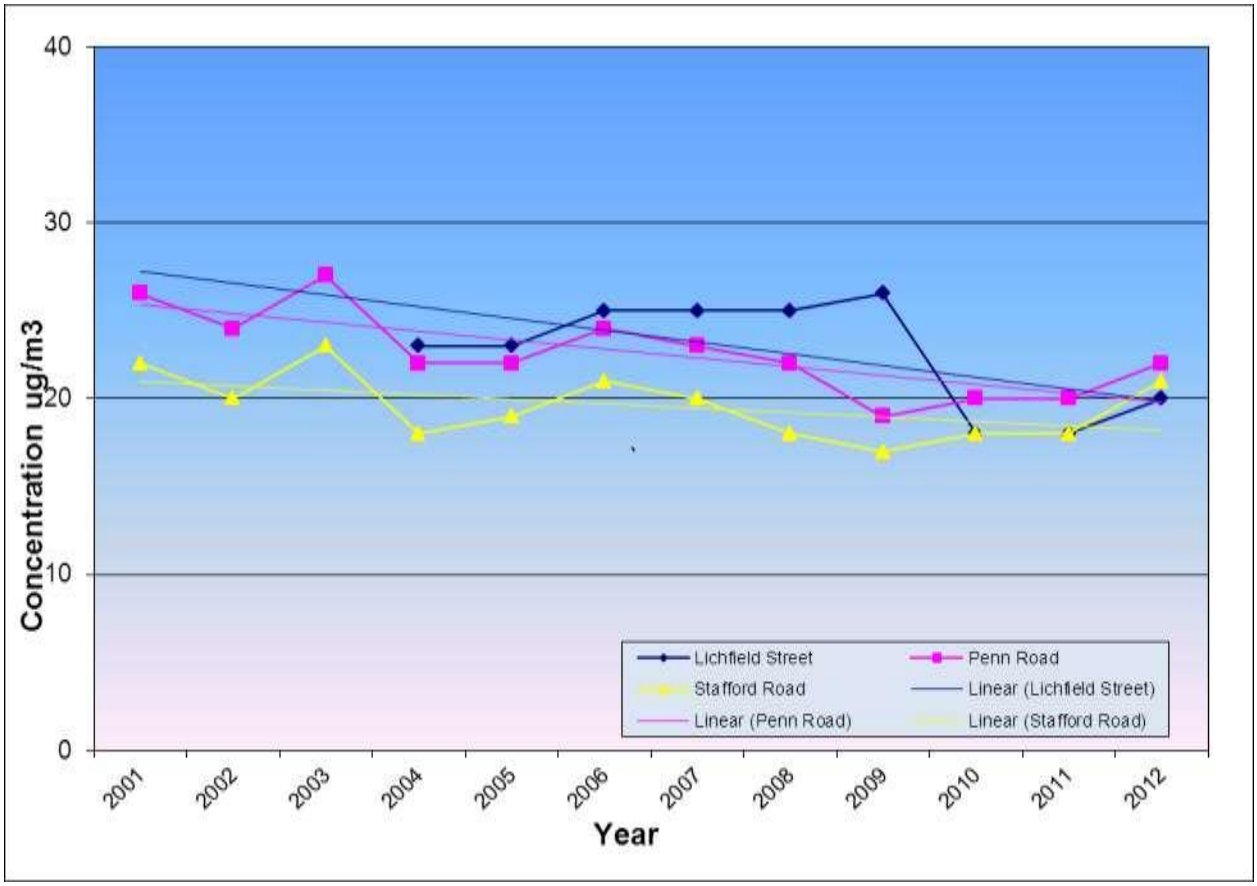
There were no exceedences of the PM_{10} annual mean objective (40µ/m^3) during 2010, 2011 or 2012 (Table 2.7). The number of exceedences of the 24-hr mean objective is below the allowed maximum of 35 per year (Table 2.8).

Long Term Trends

In order to compare the data with objectives, TEOM data has been corrected in accordance with the technical guidance. Prior to 2008 the correction factor was 1.3, which was replaced by the volatile correction model in 2008. The change to the VCM has resulted in a step change in the data therefore, for the purpose of showing long term trends, uncorrected data has been used.

Trend data for the 3 longest running sites is presented in Figure 2.4. In line with the trend in NO_2 concentrations, the overall trend for PM_{10} is downwards despite an increase during 2012. The large reduction in PM_{10} levels at Lichfield Street in 2010 was due to the implementation of the interchange project as discussed in section 2.2.1.

Figure 2.4 Trends in uncorrected annual Mean PM_{10} Concentrations



2.2.3 Sulphur dioxide

A summary of the most recent SO2 monitoring is presented in Table 2.9.

Table 2.9 Results of SO_2 Automatic Monitoring: Comparison with Objectives

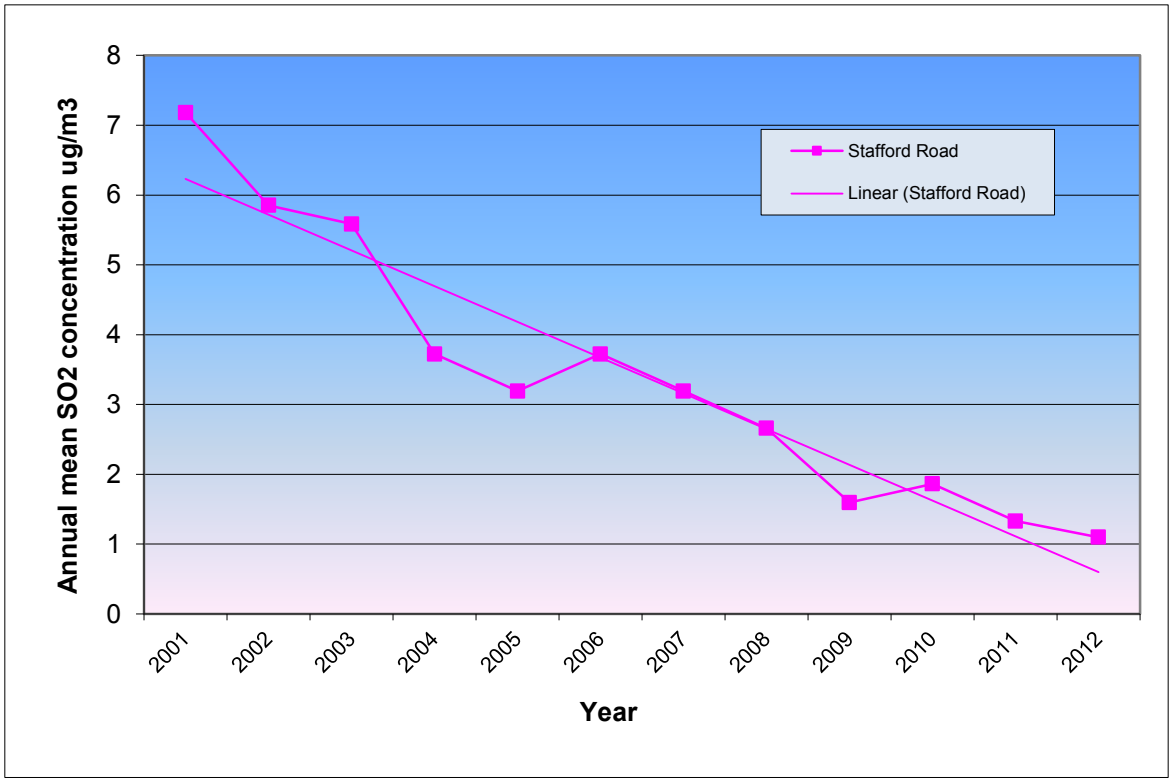
Site ID	Location	Within AQMA?	Data Capture 2012 %	Number of Exceedences of: (µg/m^3)		
				15-minute Objective (266 µg/m^3)	1-hour Objective (350 µg/m^3)	24-hour Objective (125 µg/m^3)
A4	Stafford Road	Y		0	0	0
A5	Willenhall Road	Y		0	0	0

As can be seen there were no exceedences of the 15 minute, 1 hour or 24 hour objectives during 2012.

Long term trends

The levels of sulphur dioxide have dropped significantly over the last 10 years. Although the rate of decline has slowed over recent years, the annual mean concentrations of SO_2 are continuing to fall.

Figure 2.5 Trends in annual Mean SO_2 Concentrations



2.2.3 Benzene

There are no significant sources of benzene in the city therefore the Council does not consider it necessary to monitor for this pollutant.

2.2.4 Summary of Compliance with AQS Objectives

Wolverhampton City Council has examined the results from the air monitoring sites in the city. The concentration of nitrogen dioxide is exceeding the annual mean objective at the following relevant locations within the declared AQMA:

- **Lichfield St, East of Princess Sq**
- **Lichfield St, West of Princess Sq**
- **Broad Street**
- **Princess Sq**
- **Penn Road/Goldthorne Hill/Coalway Road Junction**
- **Willenhall Road/Neachells Lane/Moseley Road junction**

As the whole of the city has been declared an AQMA based on previous exceedences, it is not necessary to proceed to a detailed assessment at these locations.

3 New Local Developments

Wolverhampton City Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

Wolverhampton City council confirms that all the following have been considered:

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Regional Air Quality Strategy

Wolverhampton Council is working closely with the 6 other West Midland local authorities to develop a regional Low Emission Strategy (LES) as part of the Defra supported West Midlands Low Emission Towns & Cities Programme (LETCP).

The LETCP seeks to promote joint working to reduce regulated road transport emissions, primarily oxides of nitrogen (NOx) and particulate matter, as well as securing reductions in greenhouse gases and noise emissions where practicable. Building on policies and measures to discourage vehicle use and encourage a shift to sustainable transport modes, the LETCP aims to achieve improvements in emissions from the vehicle fleet through the accelerated take-up of cleaner fuels and technologies and by discouraging the use of high emission vehicles.

The LES comprises of an overarching strategy document, supplementary guidance on procurement and planning, and includes a Low Emission Zone Feasibility Study, a Low Emission Vehicle and Infrastructure Plan and health awareness campaign.

The LETCP will develop a delivery programme for the policies and measures identified in the LES, including setting targets and criteria for evaluating their effectiveness. Subject to consultation, final guidance will be published by the LETCP in 2013/14 as part of the West Midlands Low Emissions Strategy.

5 Planning Applications

Table 3.1 presents the planning applications which have been received by the council since the previous assessment and were accompanied by an air quality assessment, or where one has been requested.

Table 3.1 Planning applications requiring or including an air quality assessment

Site	Application number	Proposal	Air Quality assessment
Bus layover report	09/00484/FUL	Redevelopment of Wolverhampton Bus Station Air Quality Assessment July 2012	Air quality assessment submitted as part of the planning application. The assessment concluded that the development would have no significant adverse effect on air quality
New Street Portobello	12/01241/FUL	Redevelopment of Derelict land as Nursing Home	Air quality assessment submitted as part of the planning application. The assessment concluded that the development would have no significant adverse effect on air quality
Vine Island	NA	Vine Island Air Quality Impact Assessment 47058635/AQIA/VI December 2012	Air quality assessment on the remodelling of the Vine Island road traffic junction. The assessment concluded that the remodelling work would have no significant adverse effect on air quality.

6 Air Quality Planning Policies

6.1 The Black Country Joint Core Strategy

The Black Country Core Strategy, which was adopted in February 2011, has been developed in conjunction with Dudley, Sandwell, and Walsall Councils'. It is a spatial planning document that sets out the vision, objectives and detailed spatial strategy for future development in The Black Country up to 2026. The document does not just consider land use, but also a comprehensive range of environmental, economic and social issues.

The Core Strategy allocates areas for housing where there are good public transport links, and retains employment land where there is good access to motorway networks. This will minimise traffic and congestion and so reduce air quality problems caused by traffic.

Policy ENV8 – Air Quality was developed jointly by air quality and planning officers in the context of the National Air Quality Strategy and the designated air quality management areas covering the Black Country. The Policy requires sensitive development to be located where air quality meets national air quality objectives and clarifies when an air quality impact assessment and mitigation measures will be required.

7 Local Transport Plans and Strategies

7.1 West Midlands Local Transport Plan 3

The West Midlands Local Transport Plan 2011 - 2026 (LTP3) is a statutory document which looks at the transport needs of the Metropolitan Area and sets out a way forward to deliver those needs through short, medium and long term transport solutions.

The LTP3 identifies how our transport network can play its part in the transformation of the West Midlands economy. It demonstrates how this will bring real benefits to people through its contribution to economic revival, creation of jobs, improved accessibility, improved local and national connections by road and rail and better quality of life.

A key objective of the LTP3 vision is air quality and climate change. The LTP3 target for air quality is reproduced below:

"2015/16 Performance Aim
A net reduction of Nitrogen Dioxide (NO_2) in those areas, as confirmed by each local authority within the West Midlands, where the annual average NO_2 values are predicted to exceed 40µg/m^3 between 2008 (baseline) and 2015".

7.2 The Black Country Joint Core Strategy

The Joint Core Strategy recognises the key role which the transport network plays in maintaining the economic wellbeing of the region. The strategy contains specific policies for providing an efficient and reliable transport network and links in with the LTP3.

7.3 Wolverhampton Cycling Strategy

The Council adopted the current Cycling Strategy in 1995 and has made good progress in implementing its proposals. The Government published 'The National Cycling Strategy' in 1996 and the Cycling Strategy for the West Midlands is set out in the Local Transport Plan. This provides a framework to identify specific problems encountered by cyclists and provides some of the solutions to address these.

In support of this the Black County Core Strategy contains specific targets for creating coherent networks for cycling and for walking. The joint working between the four local authorities will ensure that the Black Country has a comprehensive cycle network based on integrating the four local cycle networks, including common cycle infrastructure design standards.

7.4 Wolverhampton Walking Strategy

The walking strategy aims to encourage walking by recognising its role as a mode of transport and acknowledging that walking forms part of the solution to tackling traffic congestion.

The Strategy provides a framework for the Council to identify specific problems encountered by pedestrians and factors that deter walking in Wolverhampton and seeks to provide some of the solutions to address these. Many of the solutions are ones of information and maintenance and do not require very technical or major infrastructure solutions.

7.5 Network West Midlands

Network West Midlands connects all public transport in the West Midlands metropolitan area. This includes Birmingham, Dudley, Sandwell, Coventry, Walsall, Solihull and Wolverhampton.

It clearly identifies the complete network of bus, rail and Metro services that are easily accessible to most people in the West Midlands region.

7.6 Traveline

Traveline is a partnership of transport operators and local authorities formed to provide impartial and comprehensive information on public transport. It operates across England, Scotland and Wales.

In the West Midlands area the Traveline service is operated by West Midlands Transport Information Services Ltd (WMTIS). WMTIS is a not for profit organisation jointly funded by Centro who are the West Midlands Passenger Transport Executive

and the West Midlands Integrated Transport Authority for the region, the local bus operators, County Councils and Unitary Authorities in the region.

WMTIS provides details of all registered bus services within the West Midlands regions an area that includes Herefordshire, Shropshire, Staffordshire, Stoke-on-Trent, Telford and Wrekin, The West Midlands Conurbation, Warwickshire and Worcestershire. They also hold some information on public transport links in other areas of the country.

7.7 Wolverhampton TravelWise

Act TravelWise is a national campaign to promote and encourage sustainable and healthy travel choices, rather than relying on the car for all journeys. Act TravelWise helps people to consider what options other than the car might be available to them, particularly for shorter journeys.

The West Midlands TravelWise Group and Wolverhampton TravelWise work closely with Local Authorities in the Region, Centro and Public Transport Operators to improve conditions for people who walk, cycle and use public transport. Centro and Travel West Midlands are key partners in Company TravelWise and offer discounts to the employees of those organisations that sign up to the scheme.

7.8 Help2Travel

The Help2Travel website provides travel information to the public and has been developed as part of a European project for intelligent transport information systems. It provides users with a comprehensive overview of traffic & travel in the West Midlands region. It includes information about roadwork's and incidents on the region's roads, real-time train and bus information, as well as information & links to car parking, cycling and air quality information.

The system also enables up to the minute travel information to be exchanged easily between transport authorities, allowing them to respond more quickly and efficiently to travel problems.

8 Climate Change Strategies

8.1 Climate Local, Wolverhampton

Climate Local is an initiative run by the Local Government Association to support councils in reducing carbon emissions and improving resilience to the effects of climate.

In April, 2013 the leaders of the council's three political parties signed the Climate Local Wolverhampton commitment on behalf of the city council which commits the council to work to address both the causes and impacts of a changing climate.

8.2 Sustainability Strategy and Implementation Plan

The Sustainability Strategy and Implementation Plan will focus initially on the city council's own activities and is accompanied by an Implementation Plan that will deliver major changes. It supersedes the following documents which have been withdrawn as council policy:

- Sustainability Charter
- Wolverhampton Declaration on Climate Change
- Carbon Management Strategy and Implementation Plan
- Wolverhampton Environment Strategy
- Climate Change Strategy and Action Plan for Wolverhampton

Other strategies and action plans will remain and be reviewed and replaced as appropriate as part of the Implementation Plan.

8.3 The Black Country Joint Core Strategy

The Core Strategy identifies the main ways in which activity in The Black Country contributes towards climate change, together with ways of reducing and adapting to climate change.

8.4 The West Midlands Regional Spatial Strategy (RSS, 2004)

This strategy provides a regional strategic context for local planning decisions, and has a responsibility to help meet national targets for the reduction of greenhouse gases. The Regional Planning Body is expected to consider how the region's activities contribute towards climate change and how the region might be vulnerable to the impacts of climate change, by working with partners to develop a realistic and responsible approach to climate change in the region. This will require establishing comprehensive and up to date data in order to enable the local authorities and agencies to develop coordinated and effective solutions. Guiding principles were used in developing the Spatial Strategy to ensure that policies to assist the reduction of greenhouse gas emissions are an integral part of the West Midlands Regional Spatial Strategy.

8.5 The Wolverhampton City Strategy 2011-2026

The City Strategy includes, in its implementation plan, action RIC C1.6, the development of an integrated approach to the delivery of sustainability priorities across the city. This refers to the development of a Sustainability Strategy and Implementation Plan as mentioned above.

9 Implementation of Action Plans

The council has completed phase 1 of the interchange project. This has provided improved linkages into the bus station from the city's ring road and has significantly reduced the amount of bus traffic within the town centre. Air quality within the town centre has subsequently improved and the number of locations exceeding the objectives within the town centre area has dropped from 18 in 2009 prior to the start of the interchange project to 7 in 2012.

The council is working closely with the regional West Midlands group authorities to develop a low emissions strategy for the West Midlands as discussed in chapter 4 of this document. The low emissions strategy is intended to form the basis of future revisions to the action plan.

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

The Council has carried out a comprehensive review of all monitoring data gathered during 2012. Areas where the air quality objectives are not being met have been identified together with any significant trends.

10.1.1 Nitrogen dioxide data

Data collected since the previous Updating and Screening Assessment has shown that the number of locations exceeding the air quality objective for nitrogen dioxide has reduced significantly: In 2012 the following relevant locations were exceeding the objective:

Road side ISA's:

- Lichfield St, East of Princess Sq
- Lichfield St, West of Princess Sq
- BRO Broad Street
- PRI2 Princess Sq
- Penn Road/Goldthorne Hill/Coalway Road Junction
- Willenhall Road/Neachells Lane/Moseley Road junction

10.1.2 PM_{10} data

A review of the collected data has shown that there has been no exceedences of the PM_{10} air quality objectives. A detailed examination of trend data has shown that there has been a significant reduction in PM_{10} concentrations in real terms over the last 10 years.

The Council has concluded that PM_{10} concentrations are meeting the air quality objectives.

10.2 Conclusions relating to New Local Developments

Wolverhampton City Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

10.3 Proposed Actions

- The review of monitoring data obtained during 2012 has not identified the need to proceed to a detailed assessment for any of the pollutants listed.
- The new monitoring data has not identified the need for any additional monitoring or changes to the existing monitoring programme.
- The new monitoring data has not identified the need for any changes to the existing AQMA.
- The council will review the PM_{10} data for a further 12 months with the intention of considering amending the AQMA in relation to this pollutant.
- Wolverhampton City Council intends to submit the 2014 Progress Report as required by the review and assessment process.

11 References

(1) Local Air Quality Management – Technical Guidance LAQM.TG(09), Department for Environment, Food and Rural Affairs 2009.

(2) Technical Guidance: Screening Assessment for Biomass Boilers, AEA Energy & Environment 2008

(3) 2012 Air Quality Updating and Screening Assessment for Wolverhampton City Council

(4) LAQM Tools; Local Air Quality Management website www.airquality.co.uk

(5) Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for laboratories and Users. Report to Defra and the Devolved Administrations ED48673043 Issue 1a Feb 2008.

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Diffusion tubes are supplied and analysed by Gradko International Ltd. and are prepared using 50% TEA in acetone. The national 2012 bias adjustment factor for the tubes obtained from the review & assessment database version number 09/12, is 1.02.

Factor from Local Co-location Studies

Triplicate tubes are exposed at the automatic monitoring stations in order to calculate a bias correction factor. The correction factor is applied to the yearly average to enable comparison with the annual NO_2 objective. The results from the co-location studies for 2012 are shown in the Table A1.1. The local bias adjustment factor for 2012 is 1.05.

Table A1.1 Chemiluminescent v's Diffusion Tube Values 2012 (µg/m^3)

Site	Mean	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	% data
Automatic Monitor Intercomparison: Diffusion Tube Values µg/m^3														
Lichfield St	**39**	45	43	50	39	40	34		29	36	37	44	38	92
Lichfield St	**41**	49	47	47	30	45	35	31	36	38	25	44	60	100
Lichfield St	**40**	48	42	53	33	42	36	35	21	39	38	47	41	100
Mean		47	44	50	34	43	35	33	28	38	33	45	46	
Standard deviation		1.8	2.6	3.1	4.2	2.5	1.1	2.8	7.2	2.0	6.9	1.9	12.1	
Coefficient of variation		3.9	5.8	6.1	12.3	5.8	3.2	8.5	25.3	5.2	20.8	4.3	26.3	
Data quality		Good	Good	Good	Good	Good	Good	Good	Poor	Good	Poor	Good	Poor	
Stafford Road	**38**	49	45	42	25	32	32	31	33	39	42	42	42	100
Stafford Road	**37**	48	42	44	28		31	31	29	35	42	42	37	92
Stafford Road	**38**	49	40	46	24	34	29	29	31	39	48	45	37	100
Mean		48	42	44	26	33	30	31	31	38	44	43	39	
Standard deviation		0.6	2.4	2.1	2.0	1	2	1	2	2	3	2	3	
Coefficient of variation		1.3	5.7	4.7	7.7	4.6	5.3	3.6	6.8	5.9	7.9	3.5	7.5	
Data quality		Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	
COL	**18**	25	22	23	17	13	12	9	11	13	20	24	20	100
COLQ	**17**	25	20	21	14	14	12	11	12	11	16	22	15	100
Mean		25	21	22	16	14	12	10	12	12	18	23	18	
Standard deviation		0	1	2	2	0	0	1	1	1	2	1	4	
Coefficient of variation		1	7	7	13	2	1	15	6	7	14	6	21	
Data quality		Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	
Mean of triplicate tubes														
Lichfield St	**41**	47	44	50	34	43	35	33		38		45		
Stafford Rd	**38**	48	42	44	26	33	35	33	28	38	32	46	49	
Monthly Chemiluminescent Values														
Lichfield St	**49**	53	50	53	52	48	38	40		48		61		
Stafford Rd	**34**	42	42	42	36	31	25	25	25	31	34	36	34	
Ratios of diffusion Tube Values:Chemiluminescent values														
Lichfield St	**1.20**	1.13	1.13	1.07	1.52	1.12	1.10	1.23		1.27		1.35		
Stafford Rd	**0.89**	0.87	0.99	0.96	1.42	0.93	0.71	0.76	0.87	0.80	1.07	0.79	0.70	
Bias	**1.05**													

Discussion of Choice of Factor to Use

A comparison of the relevant bias adjustment factors is shown in Table A1.2. The national factors have been calculated using data from a number of authorities with tubes which will have been prepared and analysed in different batches and at different times.

The local bias adjustment factors are derived from triplicate co-located tubes exposed alongside automatic analysers at Lichfield St and Stafford Rd. These tubes are from the same batch as the measurement tubes and are handled, stored and analysed in the same way.

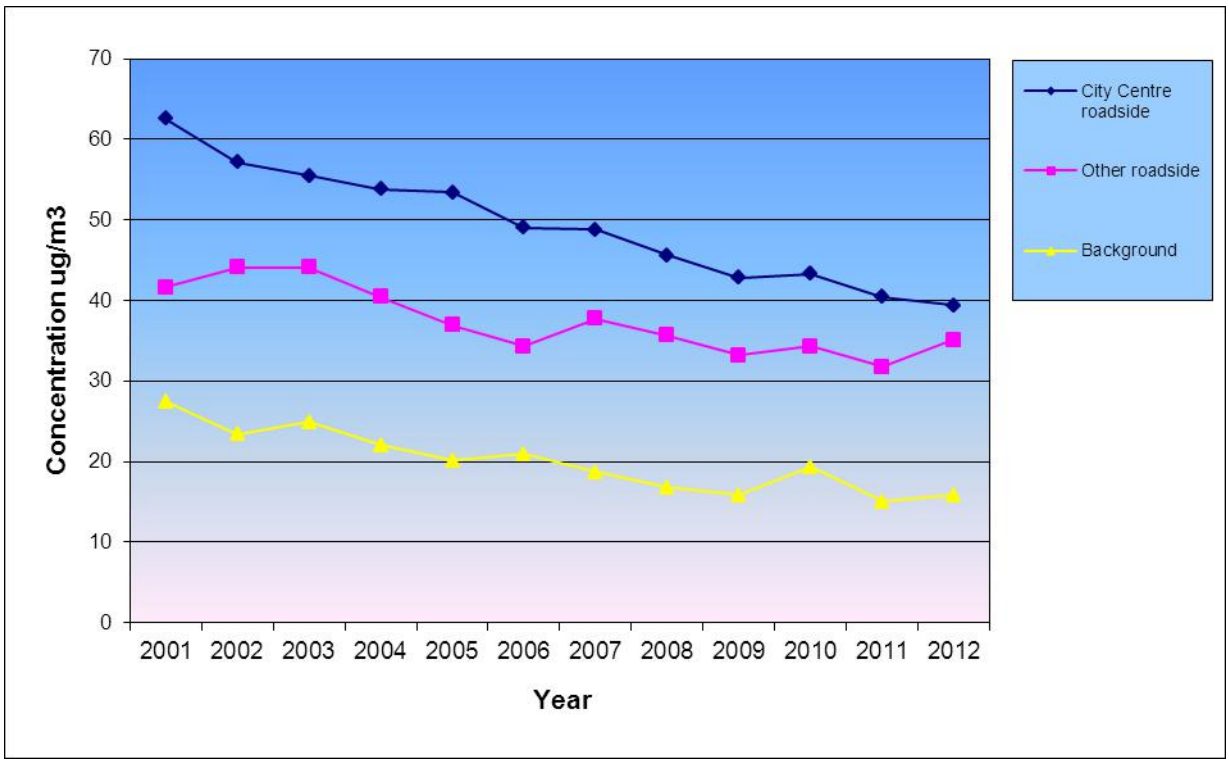
Table A1.2 National and Local Bias Adjustment Factors.

Year	National Bias Adjustment Factor	Local Bias Adjustment Factor
2001	1.45	1.01
2002	1.27	0.95
2003	1.11	0.97
2004	1.10	0.93
2005	1.10	1.00
2006	1.01	1.03
2007	0.99	0.93
2008	0.94	0.97
2009	0.97	1.08
2010	0.99	0.97
2011	0.94	0.89
2012	1.02	1.05
Mean	1.07	0.98
Std	0.15	0.05

The nationally derived bias adjustment factors prior to 2006 suggest that the tubes were significantly under reading, which is not our experience at Wolverhampton. This is particularly evident in 2001 and 2002 when the tubes appeared to under read by 45% and 27% respectively.

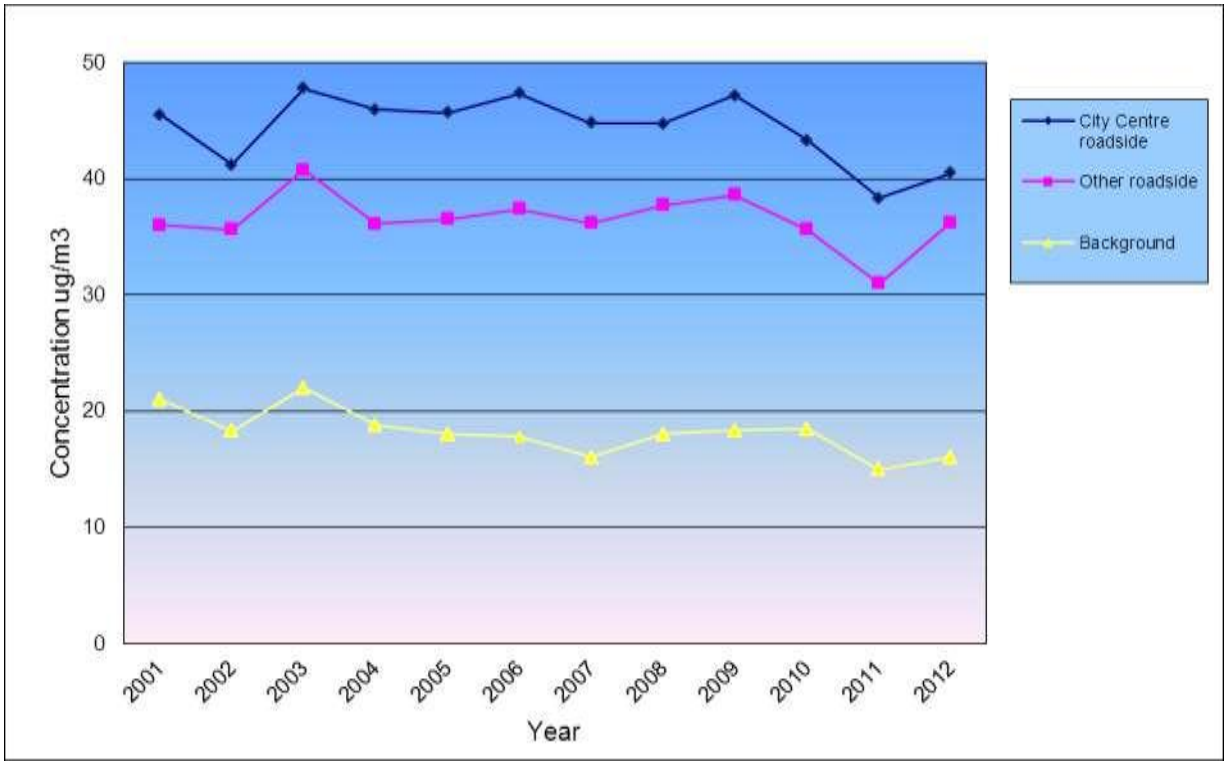
Trend data using both correction factors is presented in Figures A1.1 and A1.2. This shows that the national correction factor artificially raises the NO_2 concentrations at the start of the period, and produces an overall downward trend of between 10 and 20 $\mu g/m^3$ (Figure A1.1).

Figure A1.1 Annual Mean NO_2 Values - National Bias Adjustment Factor.



The diffusion tube NO_2 concentrations corrected with the locally derived adjustment factors (Figure A1.2) show trend data which is more consistent with the data from the automatic analysers. The locally corrected data provides better resolution and a clearer picture of NO_2 fluctuations and trends. Based on this assessment the local correction factors have been used to correct the diffusion tube data.

Figure A1.2 Annual Mean NO_2 Values - Local Bias Adjustment Factor.



PM Monitoring Adjustment

Particle monitoring is carried out using Tapered Element Oscillating Microbalance (TEOM) analysers. Data for 2009 onwards has been corrected using the volatile correction model (VCM) as required by LAQM.TG(09).

Short-term to Long-term Data adjustment

Data capture for the BIL3, CLE, QUE2, STA9 and MAR diffusion tube sites and Penn Road automatic site were below the minimum requirement of 75% data capture. The results have been adjusted to provide an estimated annual mean concentration in accordance with the method outlined in Box 3.2 of the guidance manual, using data from the closest available continuous monitoring background sites. The correction factors for each site are calculated below.

Table A.1.3 Short-Term to Long-Term Monitoring Data Adjustment for diffusion tube site ref BIL3

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
Birmingham Tyburn Rd	Background urban	32.3	29.8	1.08
Birmingham Acocks Green	Background urban	31.8	28.2	1.13
Average				**1.11**

Table A.1.4 Short-Term to Long-Term Monitoring Data Adjustment for diffusion tube site ref CLE

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
Birmingham Tyburn Rd	Background urban	32.3	31.9	1.01
Birmingham Acocks Green	Background urban	31.8	29.7	1.07
Average				**1.04**

Table A.1.5 Short-Term to Long-Term Monitoring Data Adjustment for diffusion tube site ref QUE2

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
Birmingham Tyburn Rd	Urban Background	32.3	30.5	1.06
Birmingham Acocks Green	Background urban	31.8	29.2	1.09
Average				**1.08**

Table A.1.6 Short-Term to Long-Term Monitoring Data Adjustment for diffusion tube site ref STA9

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
Birmingham Tyburn Rd	Urban Background	32.3	29.8	1.08
Birmingham Acocks Green	Background urban	31.8	31.4	1.01
Average				**1.05**

Table A.1.7 Short-Term to Long-Term Monitoring Data Adjustment for diffusion tube site ref MAR

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
Birmingham Tyburn Rd	Urban Background	32.3	35.2	0.92
Birmingham Acocks Green	Background urban	31.8	36.1	0.88
Average				**0.90**

Table A.1.8 Short-Term to Long-Term Monitoring Data Adjustment for Penn Road Automatic monitoring site NO2 monitor.

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
Birmingham Tyburn Rd	Urban Background	32.3	32.2	1.00
Birmingham Acocks Green	Urban Background	31.8	34.3	0.93
Average				**0.97**

Table A.1.9 Short-Term to Long-Term Monitoring Data Adjustment for Penn Road Automatic monitoring site PM_{10} monitor.

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
Birmingham Tyburn Rd	Urban Background	18.6	21.8	0.86
Stoke on Trent Central	Urban Background	19.4	21.4	0.91
Average				**0.88**

QA/QC of automatic monitoring

The chemiluminescent monitors are calibrated on a daily basis using on site calibration gases. This involves feeding a zero air gas, followed by a span gas containing a known concentration of NO_2, through the analyser. A correction factor is then applied based on the analyser's response. The calibration reports are checked on a daily basis to check for drift and the correct application of the correction factor. Data is stored in both the raw and corrected form.

A site visit is made every month to change filters and carry out a manual calibration, which is checked against the automatic daily calibrations. Copies of the calibration reports, calibration gas logs and engineer's reports are retained on file.

All the sites are covered by a service contract provided by Enviro Technology Services plc (ET). The sites are serviced every 6 months by an ET service engineer in accordance with the manufacturer's instructions and warranty conditions. ET also provide a 48-hour call out response to cover breakdowns.

The aim is to achieve 90% data capture and in order to minimise the loss of data the procedures in box A1.4: of LAQM.TG(09) have been adopted.

Raw data is examined on a daily basis to screen out spurious and unusual measurements having regard to the recommendations in Box A1.6 of LAQM.TG(09).

QA/QC of diffusion tube monitoring

Diffusion tubes are supplied and analysed by Gradko International Ltd. in accordance with the procedures set out in the harmonisation document: "Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance".

Gradko International Ltd is a UKAS and Workplace Analysis Scheme for Proficiency (WASP) accredited laboratory and is one of a number of laboratories which take part in the UK NO_2 diffusion tube survey.

The WASP scheme involves the use of artificially spiked diffusion tubes to test the analytical performance of the laboratory on a quarterly basis. A summary of the performance in rounds 116 - 120 covering 2012 has been obtained from the Local Authority Air Quality Support web site. During this period 100% of the results submitted were determined to be **satisfactory** based upon a z-score of □± 2. The results indicate that Gradko's analytical procedures do not have any systematic sources of bias.

The results from the nitrogen dioxide diffusion tube collocation studies for Gradko obtained from the LAQM support web site show the laboratory as generally having good precision.

The tubes arrive from Gradko and are stored in a refrigerator prior to being labelled with a site and date code. The tubes are then exposed in accordance with the start and end dates for the national NO_2 survey. Following exposure the tubes are capped and immediately dispatched to Gradko for analysis.

Triplicate tubes are exposed at the chemiluminescent monitoring stations in order to calculate bias correction which is applied to the yearly average to enable comparison with the annual NO_2 objective. The data from the duplicate and triplicate tubes covering the period of this report show that 92% of results have good precision.

2014 Air Quality Progress Report for

Wolverhampton City Council

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

March, 2014

Local Authority Officer	Dean Gooch, Anna Spinks
Department	Environmental Health (Public Protection)
Address	Wolverhampton City Council, Civic Centre, St Peter's Square, Wolverhampton, WV1 1DA
Telephone	01902 554375
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Report Reference number	WCCPR2014
Date	March 2014

Executive Summary

This progress report has been produced as part of the on-going process of the review and assessment of air quality, to provide an update on local air quality management within the city of Wolverhampton.

The report presents monitoring data for the year 2013 and considers any new local developments which have taken place in the city since the previous Updating & Screening Assessment published in December 2013.

A review of emission sources has found that there have been no new industrial processes, or any other significant sources granted planning approval which could contribute to poor air quality.

A comprehensive review of all monitoring data gathered since the previous report has been carried out. Areas where the air quality objectives are not being met have been identified together with any significant trends.

Since the previous progress report published in 2013 the levels of nitrogen dioxide have reduced compared with 2012. This has resulted in the number of locations exceeding the objective level for nitrogen dioxide falling from 6 to 2.

The improvements brought about by the completion of phase 1 of the interchange project have continued. All roads within the city centre with the exception of Broad Street are now compliant.

Wolverhampton City Council has concluded that a detailed assessment will not be required.

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1 Introduction

1.1 Description of Local Authority Area

Located to the north of the West Midlands conurbation, Wolverhampton is on the edge of the Black Country, some 15 miles from the regional centre of Birmingham. Wolverhampton functions as a major centre within the Black Country and the northern part of the West Midlands.

The city covers an area of 26 square miles (6,880 hectares) and has a population of around 250,000 residents. Wolverhampton is primarily an urban area with the majority of the land use being residential and industrial. However, there are areas of green space, allotments, sports grounds, isolated pockets of countryside, small lakes and ponds and farm land which make up approximately 13% of the city. These provide a variety of habitats for a wide range of plant and animal species.

Wolverhampton benefits from good communications links, with access to the national motorway network provided by the M6 to the east, the M54 to the north, and the M6 Toll. Wolverhampton also has a mainline railway station, which provides direct trains to Birmingham, London, the West Country and the north. Proposals are currently underway to introduce a number of improvements to the railway station and its environs through the city Interchange project. Phase 1 of this has been completed with the opening of the new bus station and access road in 2011.

The two principal pollutants affecting local air quality are nitrogen dioxide (NO_2) and fine particles (PM_{10}). The major source of these pollutants is road traffic and there are a number of roads within the city where the air quality objective for NO_2 is being exceeded. In response the Council declared the whole city an Air Quality Management Area (AQMA) in March 2005.

An Air Quality Action Plan (AQAP) has been prepared in conjunction with a cross service officer group and the local transport plan.

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedences are considered likely, the local authority must then 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.

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre μg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

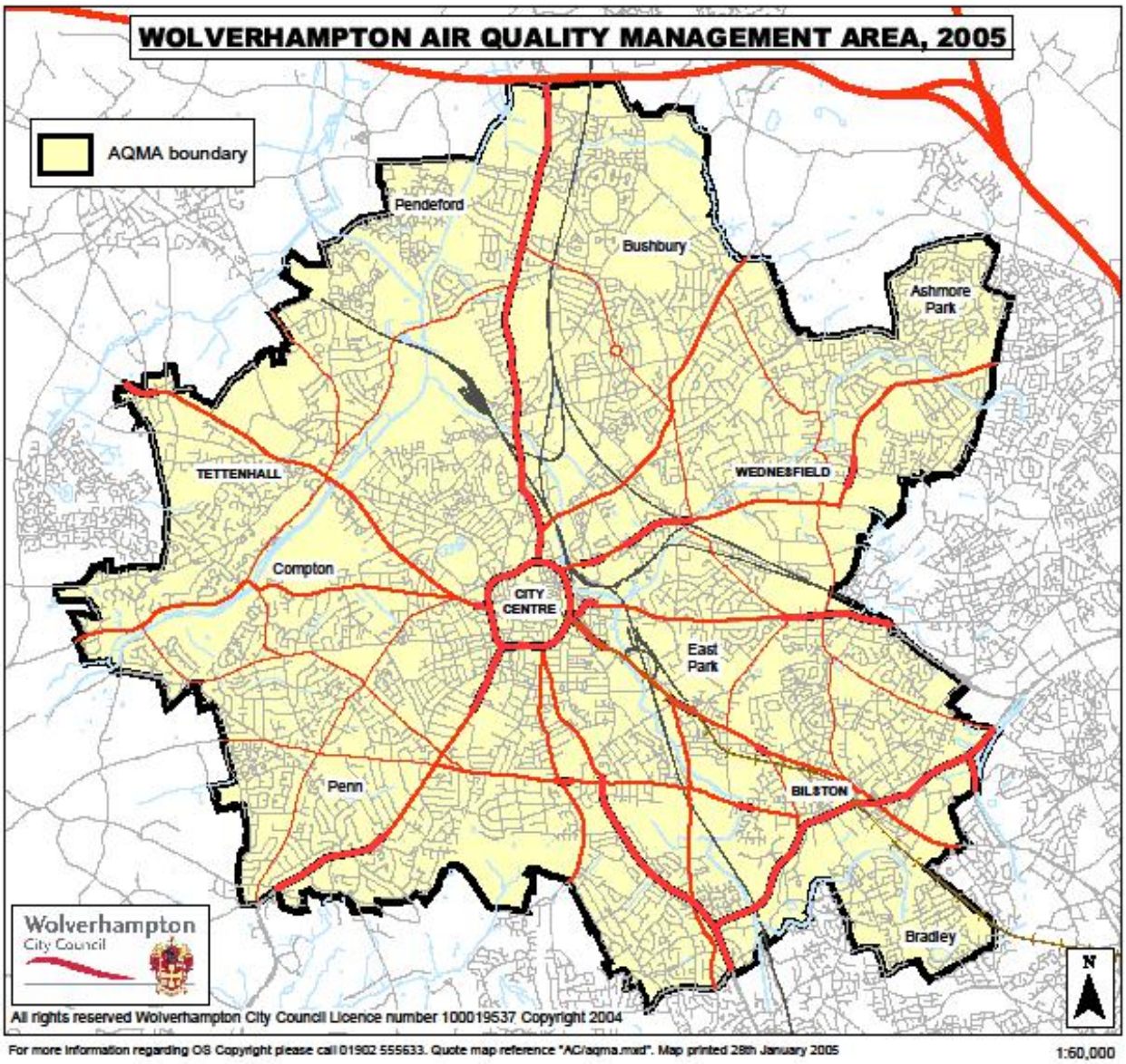
Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	5.00 µg/m^3	Annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Assessment	Exceedences	Conclusions and Recommendations
Stage 1 Report- March 1999	None	The report Identified 54 roads and 143 industrial processes within Wolverhampton which have the potential to be significant sources of pollution.
Stage 3 Report July 2001	None	A recommendation to carryout detailed investigations regarding the levels of NO_2 to confirm the prediction of the model. Further monitoring for NO_2 and PM_{10} is required along busy roads and roads with high flows of bus traffic
USA May 2003	Nitrogen dioxide, particles	Identified certain areas within the city where the objectives are likely to be exceeded. A Detailed Assessment of NO_2 and PM_{10} is required for parts of the city centre and two of the busiest junctions.
Detailed Assessment 2004	Nitrogen dioxide, particles	The Detailed Assessment confirmed that the objectives for NO_2 and PM_{10} were not being met along certain roads within the city centre and recommended the declaration of an AQMA
Section 83 (1) March 2005	Nitrogen dioxide, particles	Order designating the city of Wolverhampton an Air Quality Management Area (Appendix 1)
Annual Progress Report 2005	Nitrogen dioxide, particles	Confirmed conclusions of the Detailed Assessment and highlighted three new key developments for consideration in the 2006 USA
USA, Stage 4 Assessment and Action Plan 2006	Nitrogen dioxide, particles	Analysis of monitoring data showed that NO_2 concentrations had reduced from 2003 peak levels but continued to exceed the objectives at certain locations within the city. The levels of PM_{10} fell below the objectives during 2004 and 2005 and projected figures indicated a continuing downward trend. Nine new developments which required air quality assessments were considered. It was concluded that the developments would not result in the air quality objectives being exceeded. The action plan listed 23 actions and incorporated the Local Transport Plan into the long term air quality strategy.
Progress Report 2007	Nitrogen dioxide, particles	Monitoring data for 2006 showed the levels of NO_2 and PM_{10} increased contrary to the projected concentrations contained in the 2006 USA. Parts of the city Centre and certain busy road junctions continue to exceed the objectives for NO_2 and PM_{10}. There have been no new industrial processes or any other significant developments which could contribute to poor air quality since the 2006 USA.
Progress Report 2008	Nitrogen dioxide, particles	Levels of NO_2 and PM_{10} remain stable. There have been no new industrial processes or any other significant developments which could contribute to poor air quality since the 2006 USA.

Assessment	Exceedences	Conclusions and Recommendations
USA, Stage 4 Assessment and Action Plan 2009	Nitrogen dioxide	There are no new or significantly changed sources which could give rise to any potential exceedences outside the existing AQMA and therefore, it is not necessary to proceed to a Detailed Assessment for any of the pollutants listed in Table 1.1 Additional monitoring, or changes to the existing monitoring programme is not required.
USA 2012	Nitrogen dioxide	Monitoring data for 2011 has identified that air quality improved across the city during 2011. This has resulted in a reduction in the number of areas within Wolverhampton which are exceeding the objectives. Wolverhampton City Council has concluded that a detailed assessment will not be required.
Progress Report 2013	Nitrogen dioxide	Monitoring data for 2012 has identified that there was a small increase in nitrogen dioxide and particle concentrations across the city in 2012 compared with 2011. This was caused by weather patterns during 2012 which hampered the dispersion of pollutants. A comprehensive review of sources of both pollutants has been carried out and there is no evidence to suggest that emissions have increased. This has resulted in 6 locations which are exceeding the objective for nitrogen dioxide.

Figure 1.1 Map of AQMA Boundary



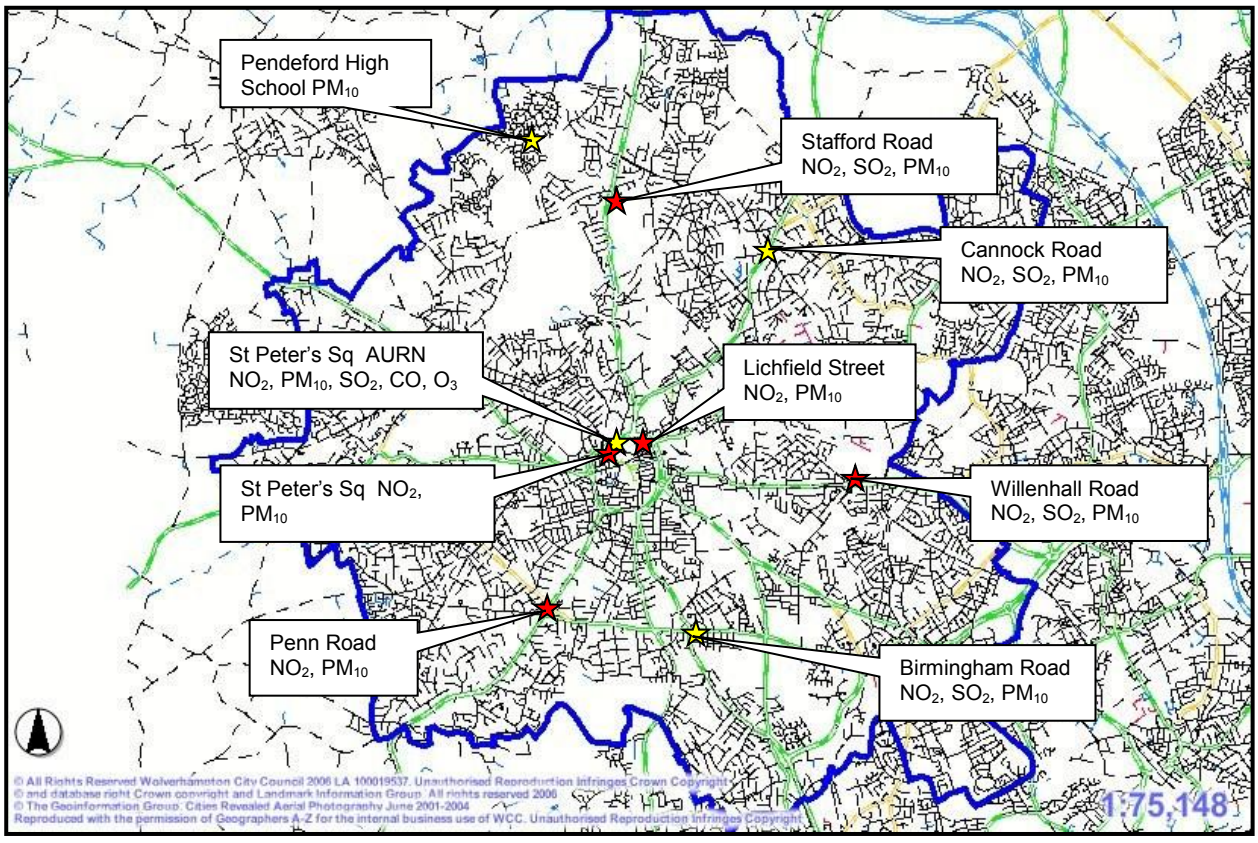
2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Wolverhampton Council operates 5 fully automatic monitoring stations, the locations of which are shown in Figure 2.1 below. These sites have been chosen to represent the worst case locations and cover the main arterial roads which link the city with major regional trunk roads and motorways. Details of the sites are given in Table 2.1.

Figure 2.1 Location of Automatic Monitoring Sites



Current automatic monitoring sites

Closed automatic monitoring sites

Wolverhampton City Boundary

Fixed stations are sited at roadside locations on the A449 Stafford Road to the north which links with the M54, the A449 Penn Road to the south, and Lichfield Street which was the main access road into the bus station and has a high flow of bus traffic.

The Council also operates a mobile monitoring station which is currently located on the A454 Willenhall Road, a main link to the M6 and Walsall. Prior to this, the mobile station was previously located on the A4123 Birmingham New Road and the A460 Cannock Road.

An additional station is located at St Peter's Square in the city centre. This site is 30m from the ring road and is classified as an urban background site.

Table 2.1 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Active sites											
A1	Lichfield Street	Roadside	391647	298784	2.5	NO_2 PM_{10}	Yes	Chemiluminescent TEOM	Yes (2m)	2m	Yes
A2	Penn Road	Roadside	390374	296775	2.5	NO_2 PM_{10}	Yes	Chemiluminescent TEOM	Yes (6.5m)	6.5m	Yes
A4	Stafford Road	Roadside	391261	302199	2.5	NO_2 SO_2 PM_{10}	Yes	Chemiluminescent UV Fluorescence TEOM	Yes (5m)	8.5m	Yes
A5	Willenhall Road	Roadside	394754	298429	2.5	NO_2 SO_2 PM_{10}	Yes	Chemiluminescent UV Fluorescence TEOM	Yes (5m)	9.5m	Yes
A9	St Peter's Square	Urban Background	390740	302692	2.5	NO_2 PM_{10}	Yes	Chemiluminescent TEOM	No	30m	No

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Closed sites											
A3	Pendeford High School	Background	390740	302692	2.5m	PM_{10}	Yes	TEOM	No	180m	No
A6	Cannock Road	Roadside	393030	300824	2.5m	NO_2 SO_2 PM_{10}	Yes	Chemiluminescent UV Fluorescence TEOM	Yes (11m)	6m	Yes
A7	Birmingham Road	Roadside	392264	296546	2.5m	NO_2SO_2 PM_{10}	Yes	Chemiluminescent UV Fluorescence TEOM	Yes (3m)	6m	Yes
A8	St Peter's Square AURN	Urban Centre	391357	298939	2.5m	NO_2SO_2 PM_{10} CO O_3	Yes	Chemiluminescent UV Fluorescence TEOM	No	30m	No

2.1.2 Non-Automatic Monitoring Sites

To complement the automatic sites NO_2 sampling is also carried out using passive diffusion tubes which are supplied and analysed by Gradko. The council has tubes at 54 locations around the city; these are detailed in Table 2.2.

The sites represent a combination of background, intermediate, and roadside locations intended to reflect the worst case situation where the general public are likely to be exposed.

Following the 2001 Stage 3 report a number of roads were designated as intensive survey areas (ISA's). The roads which have been targeted are the main arterial routes into the city centre and those streets which are narrow and congested or have a high proportion of heavy duty vehicles (HDV's). A total of 5 diffusion tubes have been located in a "W" formation along each of these roads.

Wherever possible, diffusion tubes are located on the façades of residential property. Where this is not possible tubes are attached to lampposts or other suitable street furniture.

During 2013 7 additional sites were established within the city centre to assess the impact of the proposed alterations to the traffic flow within the ring road. The proposed changes are detailed in Figure 2.2 and 2.3 and involve the creation of a new one way system, pedestrian zones and new bus stops along Princess Street, Market Street and Queen Street. These proposals will reduce vehicle traffic in these roads particularly Princess Street.

Figure 2.2 Wolverhampton City Centre Scheme

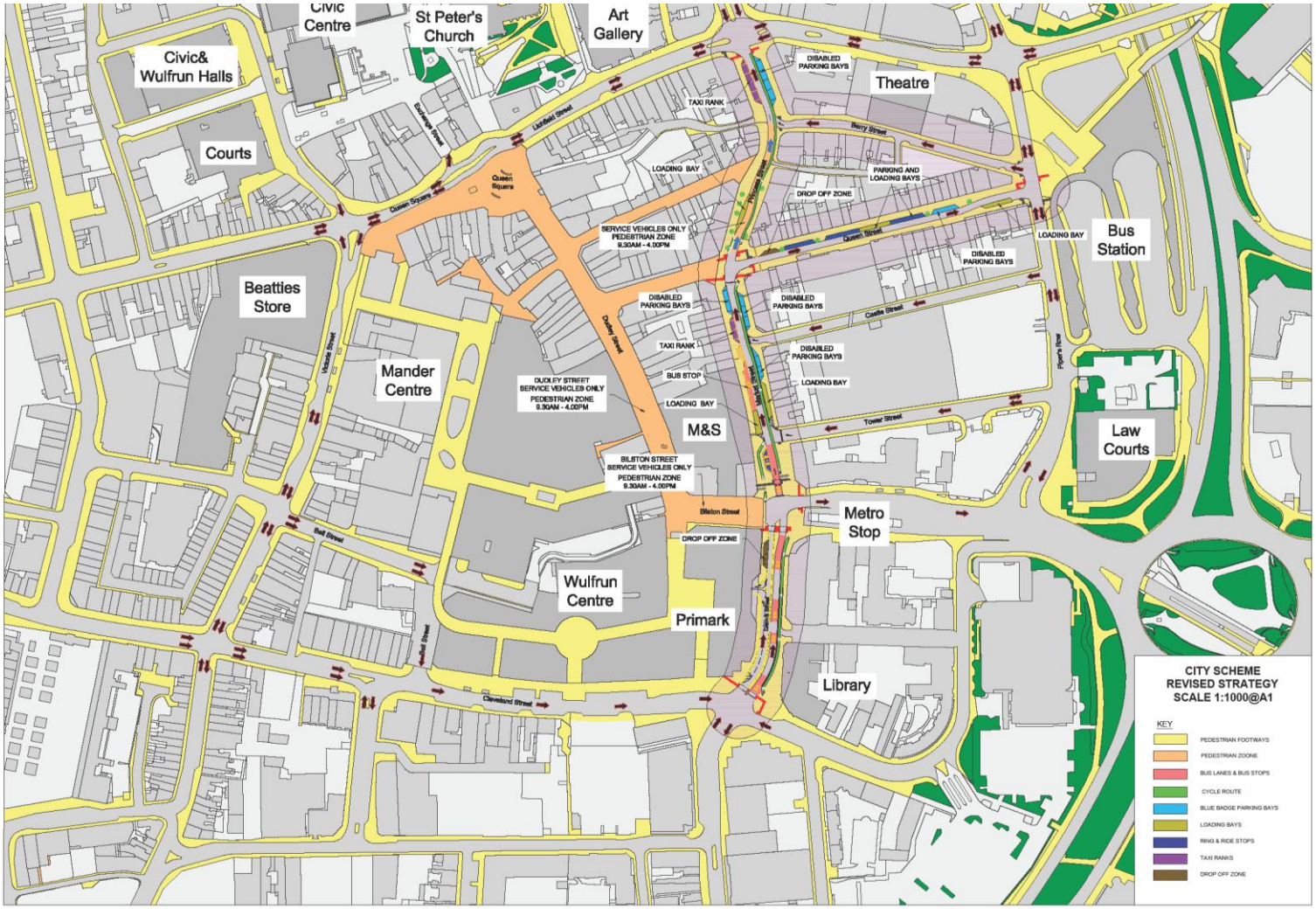


Figure 2.3 Wolverhampton City Centre scheme expanded view

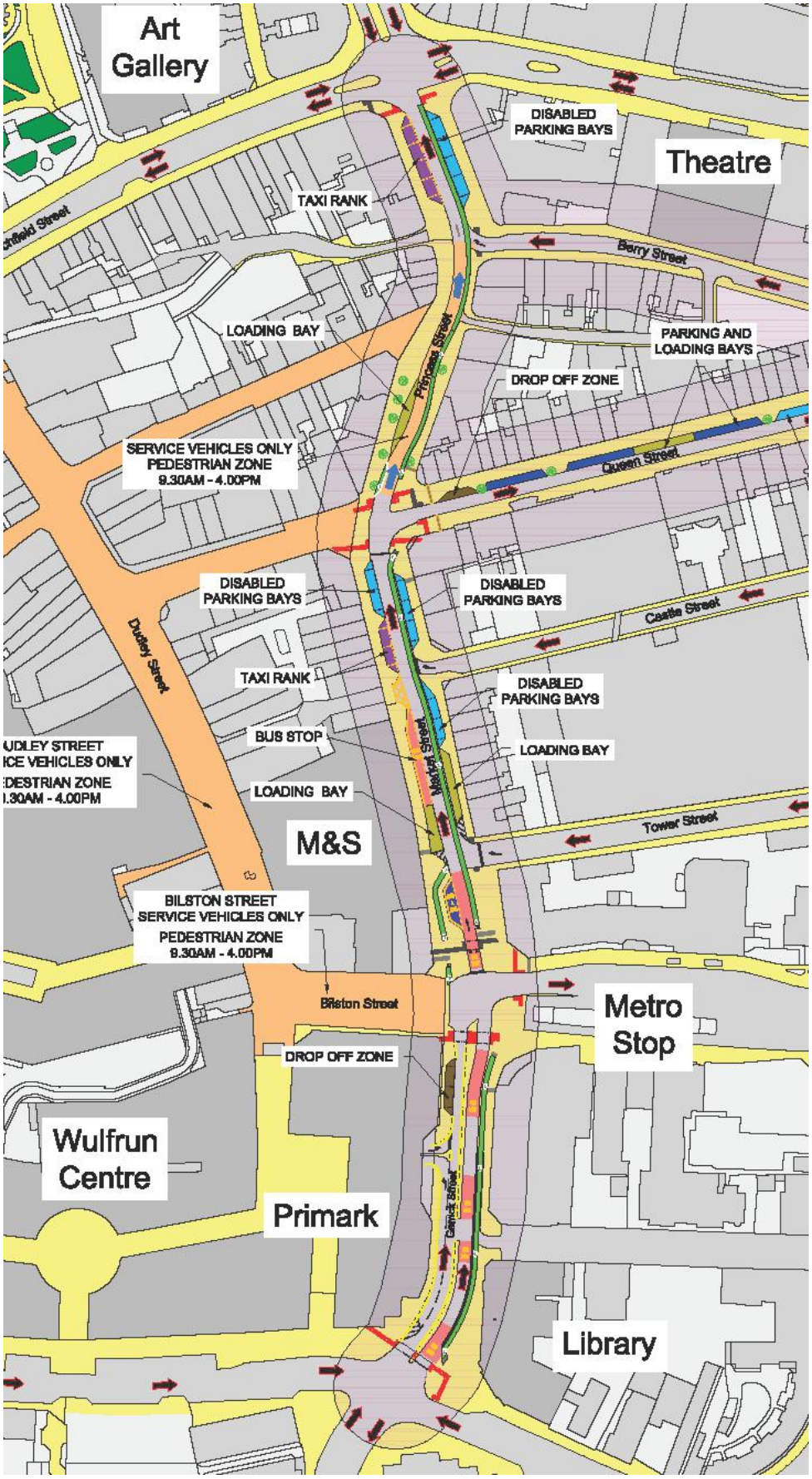


Table 2.2 Details of Non- Automatic Monitoring Sites

Site ID	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Active sites - existing										
BIL1	Roadside ISA	395057	296541	3m	NO_2	Y	N	Y(0m)	4m	Y
BIL2	Roadside ISA	395085	296475	3m	NO_2	Y	N	Y(0.5M)	4.5m	Y
BIL3	Roadside ISA	395102	296495	3m	NO_2	Y	N	N	10m	Y
BIL4	Roadside ISA	395117	296454	3m	NO_2	Y	N	Y(0m)	2.5m	Y
LIC1	Roadside ISA	391698	298776	3m	NO_2	Y	N	N	3.5m	Y
LIC2	Roadside ISA	391508	298744	3m	NO_2	Y	N	Y(0m)	3m	Y
LIC3	Roadside ISA	391620	298772	3m	NO_2	Y	N	N	6m	Y
LIC4	Roadside ISA	391643	298786	3m	NO_2	Y	Y	Y(1.5m)	1.5m	Y
LIC5	Roadside ISA	391643	298786	3m	NO_2	Y	Y	Y(1.5m)	1.5m	Y
LIC6	Roadside ISA	391643	298786	3m	NO_2	Y	Y	Y(1.5m)	1.5m	Y
LIC7	Roadside ISA	391019	296671	3m	NO_2	Y	N	N	5m	Y
LIC8	Roadside ISA	391454	298733	3m	NO_2	Y	N	N	3m	Y
LIC9	Roadside ISA	390375	296775	3m	NO_2	Y	N	Y(0m)	3m	Y
PIP1	Roadside ISA	391768	298662	3m	NO_2	Y	N	N	2m	Y
PIP2	Roadside ISA	391794	298560	3m	NO_2	Y	N	N	4m	Y
PRI1	Roadside ISA	391548	298940	3m	NO_2	Y	N	N	3m	Y

Site ID	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
PRI2	Roadside ISA	391566	298795	3m	NO_2	Y	N	Y(0m)	3m	Y
PRI3	Roadside ISA	391607	298745	3m	NO_2	Y	N	Y(0m)	4.5M	Y
PRI4	Roadside ISA	391581	298686	3m	NO_2	Y	N	N	5m	Y
PRI5	Roadside ISA	391588	298612	3m	NO_2	Y	N	N	2.5m	Y
QUE1	Roadside ISA	391607	298652	3m	NO_2	Y	N	Y(0m)	2.5m	Y
QUE2	Roadside ISA	391622	298639	3m	NO_2	Y	N	N	4.5m	Y
QUE3	Roadside ISA	391662	298665	3m	NO_2	Y	N	Y(0m)	2.5m	Y
QUE4	Roadside ISA	391707	298660	3m	NO_2	Y	N	N	4.5m	Y
STA1	Roadside ISA	391377	299818	3m	NO_2	Y	N	Y(2m)	2m	Y
STA5	Roadside ISA	391261	302199	3m	NO_2	Y	Y	Y(6.5m)	8.5m	Y
STA6	Roadside ISA	391261	302199	3m	NO_2	Y	Y	Y(6.5m)	8.5m	Y
STA7	Roadside ISA	391261	302199	3m	NO_2	Y	Y	Y(6.5m)	8.5m	Y
STA9	Roadside ISA	391527	303350	3m	NO_2	Y	N	Y(8m)	3.5m	Y
STA9A	Roadside ISA	391536	303348	3m	NO_2	Y	N	Y(0m)	7m	Y
WIL1	Roadside ISA	394266	298438	3m	NO_2	Y	N	Y(14.5m)	14.5m	Y
WIL2	Roadside ISA	394712	298428	3m	NO_2	Y	N	Y(0m)	6.5m	Y
BRI	Roadside	388182	298782	3m	NO_2	Y	N	Y(0m)	11m	Y
BRO	Roadside	391676	298865	3m	NO_2	Y	N	Y(5m)	5.5m	Y
CAN	Roadside	393008	300867	3m	NO_2	Y	N	Y(7.5m)	6.5m	Y

Site ID	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
CLE	Roadside	391485	298348	3m	NO_2	Y	N	N	5m	Y
CUL	Roadside	393371	297403	3m	NO_2	Y	N	Y(0m)	2.5m	Y
DUD	Roadside	391541	297267	3m	NO_2	Y	N	Y(1m)	3.5m	Y
HOR	Roadside	392115	298608	3m	NO_2	Y	N	Y(0.5)m	2.7m	Y
NEA	Roadside	394717	299894	3m	NO_2	Y	N	Y(4.5m)	2m	Y
OXF	Roadside	395384	296293	3m	NO_2	Y	N	Y(0m)	3.2m	Y
PAR	Roadside	392306	296547	3m	NO_2	Y	N	Y(10.3m)	2.7m	Y
TET	Roadside	389297	299886	3m	NO_2	Y	N	Y(3.2m)	3.2m	Y
TRI	Roadside	395540	296479	3m	NO_2	Y	N	Y(-1m)	11m	Y
WAT	Roadside	391134	298877	3m	NO_2	Y	N	N	3m	Y
WOL	Roadside	394031	297172	3m	NO_2	Y	N	Y(4m)	2m	Y
PRO	Intermediate	394633	296089	3m	NO_2	Y	N	N	28m	N
SPS	Intermediate	391357	298937	3m	NO_2	Y	N	N	30m	N
COL	Background	395855	300586	3m	NO_2	Y	N	N	48m	N
COLQ	Background	395855	300586	3m	NO_2	Y	N	N	48m	N
MAR	Background	390705	302736	3m	NO_2	Y	N	N	165m	N
WAR	Background	389132	296755	3m	NO_2	Y	N	N	50m	N
WRE	Background	392090	296095	3m	NO_2	Y	N	N	50m	N

Active sites - new for 2013										
CC1	Roadside	391379	298687	3m	NO_2	Y	N	N	5.9m	Y
CC2	Roadside	391309	298554	3m	NO_2	Y	N	Y (0)	2.8m	Y
CC3	Roadside	391467	298374	3m	NO_2	Y	N	N	5.8m	Y
CC4	Roadside	391461	298369	3m	NO_2	Y	N	N	1.2m	Y
CC5	Roadside	391538	298327	3m	NO_2	Y	N	N	9.5m	Y
CC6	Roadside	391539	298372	3m	NO_2	Y	N	N	4.8m	Y
CC7	Roadside	391597	298579	3m	NO_2	Y	N	Y (0)	2.9m	Y
Closed sites										
WIL3	Roadside ISA	394754	298429	3m	NO_2	Y	N	Y(1m)	10m	Y
WIL4	Roadside ISA	394754	298429	3m	NO_2	Y	N	Y(1m)	10m	Y
WIL5	Roadside ISA	394754	298429	3m	NO_2	Y	N	Y(1m)	10m	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide (NO_2)

Automatic Monitoring Data

The annual mean concentrations from the automatic monitoring stations for the previous 3 years are presented in Table 2.3, exceedences of the objectives are highlighted in red.

Table 2.3 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2013 %	Annual mean concentrations (distance corrected) μg/m^3		
				2011	2012	2013
A1	Lichfield Street	Y	86	36	**48**	39
A2	Penn Rd	Y	73	38	**43**[1]	**45**
A4	Stafford Rd	Y	99	34	31	31
A5	Willenhall Rd	Y	97	38	**46**	37
A8	St Peter's Sq	Y	99	No result	32	31

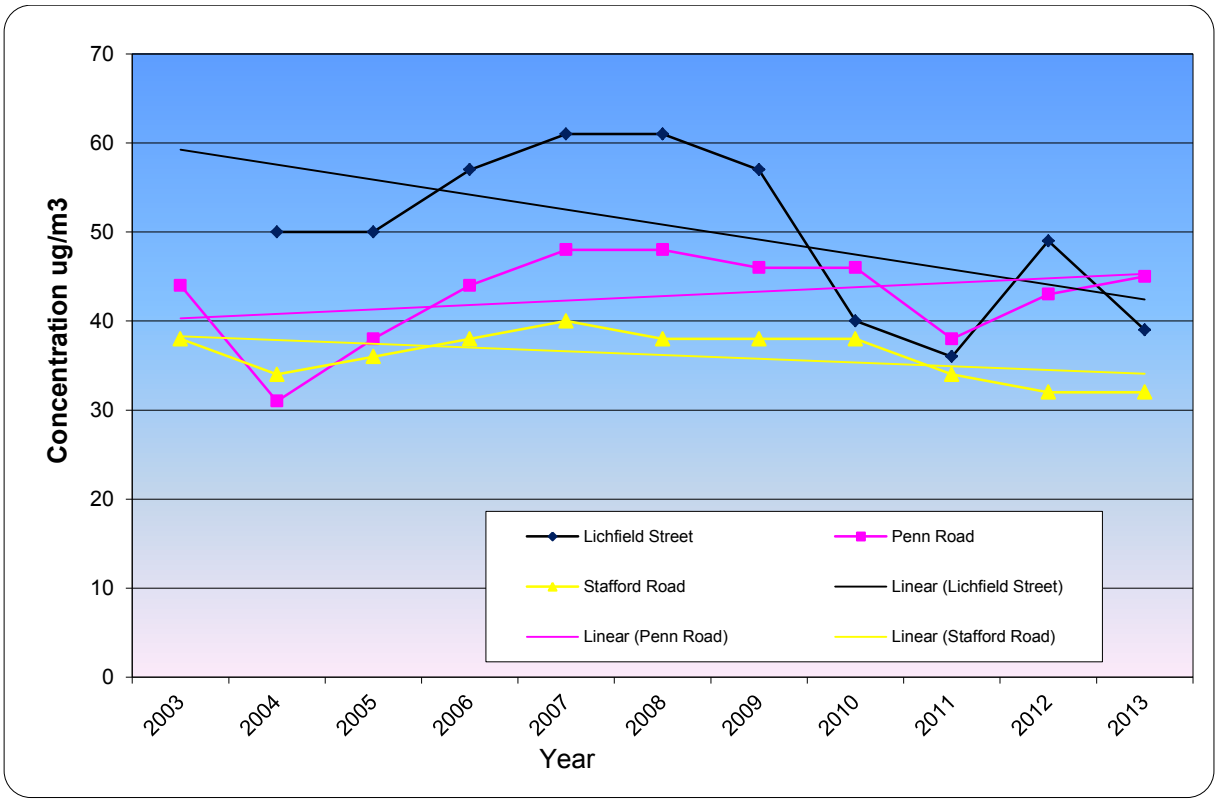
[1] Annualised data (Appendix A)

The yearly mean NO_2 concentrations from the longest running automatic monitoring stations are presented in Figure 2.2.

The long term trend at Penn Road indicates an overall increase in NO_2 concentrations since monitoring began in 2001. Levels of NO_2 dropped in 2011 however there has been an increase over the last 2 years.

The trend graph for Stafford Road shows that NO_2 levels have remained fairly stable. There was a small increase in NO_2 concentrations between 2001 and 2007 followed by a gradual decrease. Current levels are now 2 μg/m^3 below the 2001 concentration.

Figure 2.4 Trends in Annual Mean NO_2 Concentrations Measured at Automatic Monitoring Sites



Lichfield Street is within the city centre and prior to 2010 was one of the main access routes into the bus station. The levels of NO_2 in Lichfield Street before 2010 were considerably higher than at other roadside locations due to the number of buses travelling along the road.

In 2010 Lichfield Street was closed to traffic during the bus station redevelopment project which resulted in a large decrease in the levels of NO_2. The project was completed in the summer of 2011 and the number of buses now using Lichfield Street has been reduced significantly. The levels of NO_2 remained below the objective in 2011 and then increased in 2012, a trend which occurred at other road side sites across the city. This increase was higher in Lichfield Street than at other roadside sites in the city and is due in part to artificially low levels of NO_2 in 2010 and 2011 caused by the closure of the road for part of that period, and favourable weather conditions during 2011 which helped disperse emissions.

The 2013 results show a reduction in NO_2 and levels are now below the air quality objective for NO_2.

Table 2.4 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2013 %	Number of Exceedences of hourly mean (200 µg/m^3)		
				2011	2012	2013
A1	Lichfield Street	Y	86	1	1	0
A2	Penn Road/Goldthorne Hill	Y	83	0	1	0
A4	Stafford Road/Church Road	Y	99	0	0	0
A5	Willenhall Road/Neachells Lane	Y	97	0	5	1
A8	St Peter's Square	Y	99	No result	0	0

A comparison against the 1-hour mean objective (Table 2.4) shows that exceedences of the hourly mean object were below the allowed 18 exceedences per year at all monitoring sites.

Diffusion Tube Monitoring Data

Diffusion tube results for the previous 3 years are shown in Table 2.5. The annual average for each site is presented as the bias corrected measured value, corrected for distance to the nearest relevant receptor in accordance with the procedure detailed in Box 2.3 of technical Guidance LAQM.TG(09). Exceedences of the annual mean objective value are highlighted in red.

The bias correction is obtained from the co-location of triplicate tubes alongside the Stafford Road and Lichfield Street automatic monitoring stations (see Appendix A).

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA	% Data capture 2013	Annual mean concentration µg/m^3 (adjusted for bias and distance)		
				2011 (Bias 0.89)	2012 (Bias 1.05)	2013 (Bias 0.92)
BIL1	Lichfield St, Bilston	Y	92	37	**42**	**43**
BIL2	Lichfield St, Bilston	Y	92	32	34	33
BIL3	Lichfield St, Bilston	Y	100	33	**47**[2]	36
BIL4	Lichfield St, Bilston	Y	100	33	37	33
LIC1	Lichfield Street	Y	92	33	**42**	**41**
LIC2	Lichfield Street	Y	92	**45**	**46**	39
LIC3	Lichfield Street	Y	100	36	**47**	40
LIC4[1]	Lichfield Street	Y	92	32	40	38
LIC7	Lichfield Street	Y	100	33	40	37
LIC8	Lichfield Street	Y	100	31	36	29
LIC9	Lichfield Street	Y	92	34	**47**	41
PIP1	Pipers Row	Y	92	37	**46**	41
PIP2	Pipers Row	Y	100	35	38	36
PRI1	Stafford Street	Y	100	39	39	36
PRI2	Princess Square	Y	100	38	**41**	36
PRI3	Princess Street	Y	100	32	32	32
PRI4	Princess Street	Y	100	**48**	40	36
PRI5	Princess Street	Y	83	35	35	35
QUE1	Queen Street	Y	100	36	32	30
QUE2	Queen Street	Y	100	**41**	39[2]	33
QUE3	Queen Street	Y	100	**46**	36	31
QUE4	Queen Street	Y	100	41	37	28
STA1	Stafford Road	Y	92	28	30	27
STA5[1]	Stafford Road	Y	100	34	38	31
STA9	Stafford Road	Y	100	**47**	**45**[2]	30
STA9A	Stafford Road	Y	100	31	35	32
WIL1	Willenhall Road	Y	100	23	27	23
WIL2	Willenhall Road	Y	100	36	39	37
WIL3[1,]	Willenhall Road	Y	100	30	34	closed
PAR	Birmingham Road	Y	83	31	36	30
BRI	Bridgnorth Road	Y	100	21	22	20
BRO	Broad Street	Y	100	**44**	**45**	41
CAN	Cannock Road	Y	92	28	30	27
CLE	Cleveland Street	Y	92	31	32[2]	26
CUL	Culwick Street	Y	100	23	26	21
DUD	Dudley Road	Y	100	26	27	25
HOR	Horseley Fields	Y	100	36[2]	36	35
NEA	Neachells Lane	Y	100	22	24	21
OXF	Oxford Street	Y	100	25	31	30
TET	Tettenhall Road	Y	100	38	39	34
WAT	Waterloo Road	Y	92	30	35	34
WOL	5 Wolsley Road	Y	100	19	20	19
PRO	Prosser Street	Y	92	25	27	25
SPS	St Peter's Square	Y	100	23	26	26
TRI	Trinity Street	Y	92	24	25	22
COL	Coleman Avenue	Y	100	16	18	16
MAR	Marsh Lane	Y	83	13	18[2]	15
WAR	Warstones Road	Y	83	14	15	13
WRE	W'ton Rd East	Y	92	15	17	16
CC1	Queen Square	Y	83	No Result	No Result	29
CC2	Victoria Street	Y	83	No Result	No Result	27
CC3	Cleveland Street	Y	83	No Result	No Result	29
CC4	Cleveland Street	Y	83	No Result	No Result	29
CC5	Cleveland Street	Y	83	No Result	No Result	28
CC6	Cleveland Street	Y	75	No Result	No Result	31[2]
CC7	Market Street	Y	83	No Result	No Result	31

[1] Mean of triplicate tubes

[2] Annualised data (Appendix A)

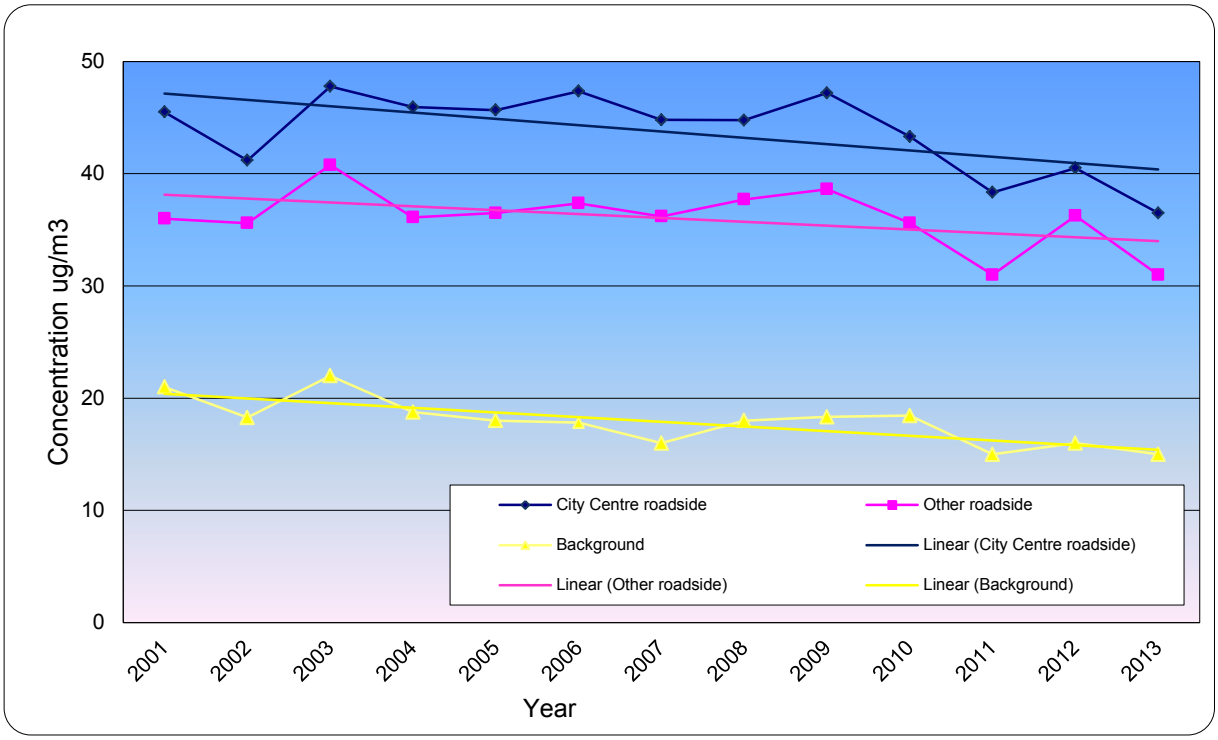
Table 2.6 provides a summary of the results from the intensive survey areas, the remaining roadside tubes and the background tubes for 2011, 2012 and 2013. The results are presented as the annual mean concentration calculated from individual tubes located along each particular road and site type corrected for bias and distance.

The data collected from the automatic monitoring stations and the diffusion tube sites shows that annual mean NO_2 concentrations decreased in 2013 at the majority of locations compared to 2012.

Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes: ISA, Roadside, Intermediate and Background Sites

Location	Within AQMA	Annual mean concentration µg/m^3 (adjusted for bias and distance)		
		2011 (Bias 0.89)	2012 (Bias 1.05)	2013 (Bias 0.92)
Lichfield Street, Bilston	Y	34	39	36
Lichfield Street, East of Princess Square	Y	34	**43**	39
Lichfield Street, West of Princess Square	Y	37	**41**	34
Princess Street/Stafford Street	Y	38	37	35
Queen Street	Y	**41**	35	31
Stafford Road	Y	31	36	30
Willenhall Road	Y	30	34	29
Pipers Row	Y	36	**41**	38
Other Roadside sites	Y	29	31	26
Intermediate sites	Y	24	26	24
Background sites	Y	15	16	15

Figure 2.5 Trends in Annual Mean NO_2 Concentrations at Diffusion Sites



The trend data (Fig 2.3) shows an overall reduction in NO_2 at the diffusion tube sites over the past 12 years.

2.2.2 Particulate Matter (PM_{10})

A summary of the most recent TEOM data from the automatic monitoring stations is presented in Tables 2.7 and 2.8. The data has been corrected using the King's College volatile correction model (VCM) in accordance with technical guidance document LAQM.TG(09).

Table 2.7 Results of Automatic Monitoring for PM_{10}: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2013 %	Annual mean concentrations (µg/m^3) VCM corrected		
				2011	2012	2013
A1	Lichfield Street	Y	94	23	20	21
A2	Penn Road	Y	88	25	22*	23
A3	St Peter's Car Park	Y	99		19	19
A4	Stafford Road	Y	99	23	21	22
A5	Willenhall Road	Y	96	23	21	20

* Annualised data (Appendix A)

Table 2.8 Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2010 %	Number of Exceedences of hourly mean (50 µg/m^3) *If data capture < 90%, include the 90th %ile of hourly means in brackets.*		
				2011	2012	2013
A1	Lichfield Street	Y	94	16	7	8
A2	Penn Road	Y	88	15	8*	10(38)
A3	Pendeford High School	Y	99	7	9	6
A4	Stafford Road	Y	99	11	11	5
A5	Willenhall Road	Y	96	14	6	6

* Annualised data

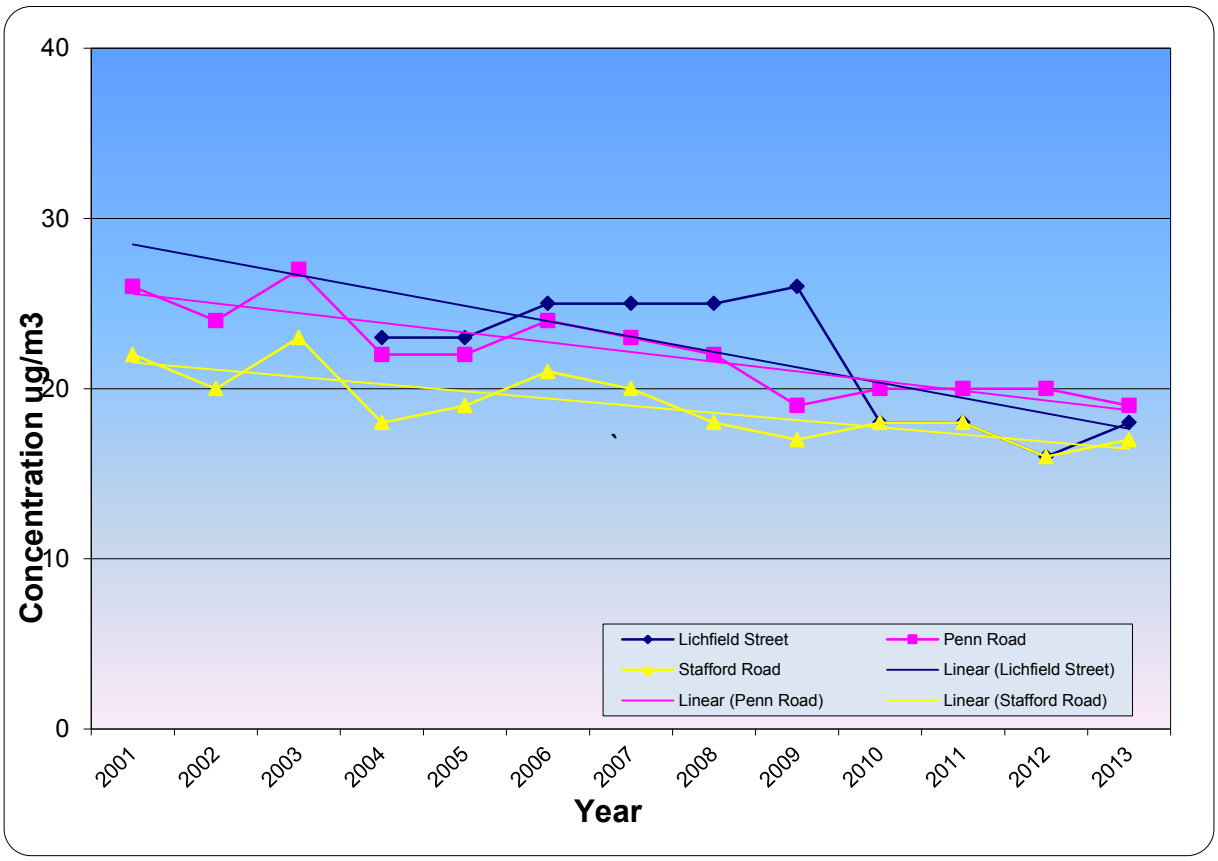
There were no exceedences of the PM_{10} annual mean objective (40µ/m^3) during 2011, 2012 or 2013 (Table 2.7). The number of exceedences of the 24-hr mean objective is below the allowed maximum of 35 per year (Table 2.8).

Long Term Trends

In order to compare the data with objectives, TEOM data has been corrected in accordance with the technical guidance. Prior to 2008 the correction factor was 1.3, which was replaced by the volatile correction model in 2008. The change to the VCM has resulted in a step change in the data therefore, for the purpose of showing long term trends, uncorrected data has been used.

Trend data for the 3 longest running sites is presented in Figure 2.4. In line with the trend in NO_2 concentrations, the overall trend for PM_{10} is downwards. The large reduction in PM_{10} levels at Lichfield Street in 2010 was due to the implementation of the interchange project as discussed in section 2.2.1.

Figure 2.6 Trends in uncorrected annual Mean PM_{10} Concentrations



2.2.3 Sulphur dioxide

A summary of the most recent SO2 monitoring data is presented in Table 2.9. There were no exceedences of the 15 minute, 1 hour or 24 hour objectives during 2013.

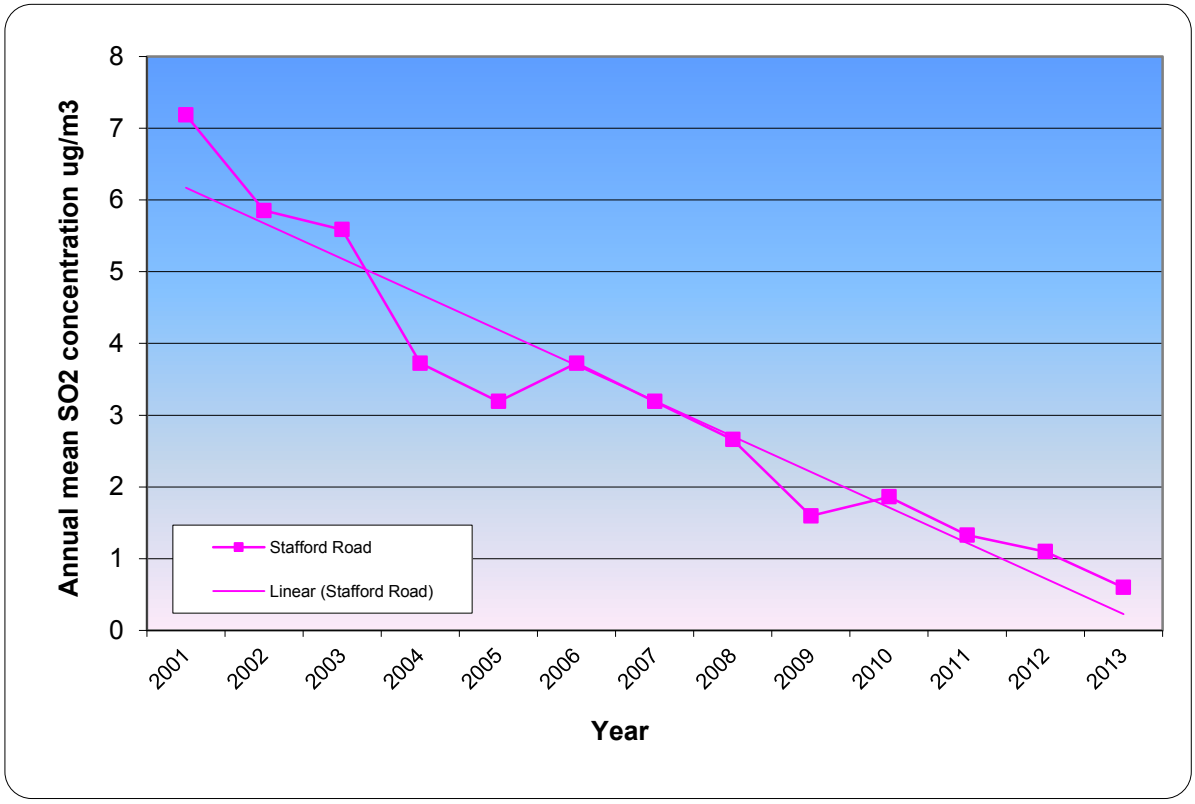
Table 2.9 Results of SO_2 Automatic Monitoring: Comparison with Objectives

Site ID	Location	Within AQMA?	Data Capture 2013 %	Number of Exceedences of: (µg/m^3)		
				15-minute Objective (266 µg/m^3)	1-hour Objective (350 µg/m^3)	24-hour Objective (125 µg/m^3)
A4	Stafford Road	Y	98%	0	0	0
A5	Willenhall Road	Y	95%	0	0	0

Long term trends

The levels of sulphur dioxide have dropped significantly over the last 12 years. Although the rate of decline has slowed over recent years the annual mean concentrations of SO_2 are continuing to fall.

Figure 2.7 Trends in annual Mean SO_2 Concentrations



Benzene

There are no significant sources of benzene in the city therefore the Council does not consider it necessary to monitor for this pollutant.

2.2.3 Summary of Compliance with AQS Objectives

Wolverhampton City Council has examined the results from the air monitoring sites in the city. The concentration of nitrogen dioxide is exceeding the annual mean objective at the following relevant locations within the declared AQMA:

- **Broad Street**
- **Penn Road/Goldthorn Hill/Coalway Road Junction**

This is a significant reduction from the previous year during which there were 6 areas exceeding the objective for nitrogen dioxide.

As the whole of the city has already been declared an AQMA, it is not necessary to proceed to a detailed assessment at these locations.

3 New Local Developments

Wolverhampton City Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

Wolverhampton City Council confirms that all the following have been considered:

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Regional Air Quality Strategy

Wolverhampton Council is working closely with the 6 other West Midland local authorities to develop a regional Low Emission Strategy (LES) as part of the Defra supported West Midlands Low Emission Towns & Cities Programme (LETCP).

The LETCP seeks to promote joint working to reduce regulated road transport emissions, primarily oxides of nitrogen (NOx) and particulate matter, as well as securing reductions in greenhouse gases and noise emissions where practicable. Building on policies and measures to discourage vehicle use and encourage a shift to sustainable transport modes, the LETCP aims to achieve improvements in emissions from the vehicle fleet through the accelerated take-up of cleaner fuels and technologies and by discouraging the use of high emission vehicles.

The LES comprises of an overarching strategy document, supplementary guidance on procurement and planning, and includes a Low Emission Zone Feasibility Study, a Low Emission Vehicle and Infrastructure Plan and health awareness campaign.

The LETCP will develop a delivery programme for the policies and measures identified in the LES, including setting targets and criteria for evaluating their effectiveness.

The LETCP published the Good Practice Air Quality Planning Guidance in May 2014. The council is currently working in conjunction with Dudley, Sandwell and Walsall council's to develop a Black Country supplementary planning guide to adopt this guidance into planning policy.

A good practice guide for procurement is expected to be published in 2015 together with the over-arching Low Emissions Strategy document. These documents along with the planning guide are intended to form the basis of the council's revised Air Quality Management Plan.

In addition to the good practice guides the group has commissioned AEA Technology to undertake a detailed low emission zone feasibility study. The effectiveness of low emissions zones on air quality is being assessed at selected locations within the West Midlands area, using detailed road traffic data, dispersion modelling and source

apportionment. The first stage, which has now been completed, was to determine the contribution of the different types and ages of road vehicles to atmospheric nitrogen dioxide concentrations.

All vehicles in the UK must comply with European emission standards. Depending on the age of the vehicle, cars and light goods vehicles must meet Euro 1-6, and heavy duty vehicles must meet Euro I to VI. Euro 1/I being the oldest most polluting, and Euro 6/VI being the newest and least polluting. The emissions of nitrogen dioxide from different Euro class vehicles have been compared in order to identify which ones emit the highest levels of nitrogen dioxide and would offer the greatest benefits by being controlled by a low emission zone. The findings of this work stream have now been published and have identified diesel cars and buses to be the most significant source of nitrogen dioxide emissions within the West Midlands.

The next stage of the assessment is to project forwards to 2018 and 2026 using assumptions for the age composition of the vehicle fleet and emission performance of future vehicles. These are based on projections from the National Atmospheric Emissions Inventory and provide predicted reductions in pollution concentrations based on the normal rate of replacement of older vehicles.

The final stage of the assessment, which is currently on going, will be to determine the reduction in nitrogen dioxide concentrations brought about by introducing low emission zones where future pollution levels are predicted to remain above air quality objectives in future years. Low emissions zones in effect accelerate the rate that older vehicles are replaced with newer less polluting vehicles in a specific geographically defined area, by penalizing certain classes of older vehicles that may enter the area.

The classes of vehicles being considered are older buses, HGV’s and private cars which meet Euro 4 or less. The reductions brought about by introducing a LEZ will be compared with the baseline reductions expected from the “do nothing” scenario to determine if a LEZ will be effective. As part of this assessment a cost benefit analysis will be carried out where accelerated improvements are indicated.

5 Planning Applications

The council did not receive or request an air quality assessment in relation to a planning application during 2013.

6 Air Quality Planning Policies

6.1 The Black Country Joint Core Strategy

The Black Country Core Strategy, which was adopted in February 2011, has been developed in conjunction with Dudley, Sandwell, and Walsall Councils. It is a spatial planning document that sets out the vision, objectives and detailed spatial strategy for future development in The Black Country up to 2026. The document does not just consider land use, but also a comprehensive range of environmental, economic and social issues.

The Core Strategy allocates areas for housing where there are good public transport links, and retains employment land where there is good access to motorway networks. This will minimise traffic and congestion and so reduce air quality problems caused by traffic.

Policy ENV8 – Air Quality was developed jointly by air quality and planning officers in the context of the National Air Quality Strategy and the designated air quality management areas covering the Black Country. The Policy requires sensitive development to be located where air quality meets national air quality objectives and clarifies when an air quality impact assessment and mitigation measures will be required.

7 Local Transport Plans and Strategies

7.1 West Midlands Local Transport Plan 3

The West Midlands Local Transport Plan 2011 - 2026 (LTP3) is a statutory document which looks at the transport needs of the Metropolitan Area and sets out a way forward to deliver those needs through short, medium and long term transport solutions.

The LTP3 identifies how our transport network can play its part in the transformation of the West Midlands economy. It demonstrates how this will bring real benefits to people through its contribution to economic revival, creation of jobs, improved accessibility, improved local and national connections by road and rail and better quality of life.

A key objective of the LTP3 vision is air quality and climate change. The LTP3 target for air quality is reproduced below:

"2015/16 Performance Aim
A net reduction of Nitrogen Dioxide (NO_2) in those areas, as confirmed by each local authority within the West Midlands, where the annual average NO_2 values are predicted to exceed 40µg/m^3 between 2008 (baseline) and 2015".

7.2 The Black Country Joint Core Strategy

The Joint Core Strategy recognises the key role which the transport network plays in maintaining the economic wellbeing of the region. The strategy contains specific policies for providing an efficient and reliable transport network and links in with the LTP3.

7.3 Wolverhampton Cycling Strategy

The Council adopted the current Cycling Strategy in 1995 and has made good progress in implementing its proposals. The Government published 'The National Cycling Strategy' in 1996 and the Cycling Strategy for the West Midlands is set out in the Local Transport Plan. This provides a framework to identify specific problems encountered by cyclists and provides some of the solutions to address these.

In support of this the Black County Core Strategy contains specific targets for creating coherent networks for cycling and for walking. The joint working between the four local authorities will ensure that the Black Country has a comprehensive cycle network based on integrating the four local cycle networks, including common cycle infrastructure design standards.

7.4 Wolverhampton Walking Strategy

The walking strategy aims to encourage walking by recognising its role as a mode of transport and acknowledging that walking forms part of the solution to tackling traffic congestion.

The Strategy provides a framework for the Council to identify specific problems encountered by pedestrians and factors that deter walking in Wolverhampton and seeks to provide some of the solutions to address these. Many of the solutions are ones of information and maintenance and do not require very technical or major infrastructure solutions.

7.5 Network West Midlands

Network West Midlands connects all public transport in the West Midlands metropolitan area. This includes Birmingham, Dudley, Sandwell, Coventry, Walsall, Solihull and Wolverhampton.

It clearly identifies the complete network of bus, rail and Metro services that are easily accessible to most people in the West Midlands region.

7.6 Traveline

Traveline is a partnership of transport operators and local authorities formed to provide impartial and comprehensive information on public transport. It operates across England, Scotland and Wales.

In the West Midlands area the Traveline service is operated by West Midlands Transport Information Services Ltd (WMTIS). WMTIS is a not for profit organisation jointly funded by Centro who are the West Midlands Passenger Transport Executive

and the West Midlands Integrated Transport Authority for the region, the local bus operators, County Councils and Unitary Authorities in the region.

WMTIS provides details of all registered bus services within the West Midlands regions an area that includes Herefordshire, Shropshire, Staffordshire, Stoke-on-Trent, Telford and Wrekin, The West Midlands Conurbation, Warwickshire and Worcestershire. They also hold some information on public transport links in other areas of the country.

7.7 Wolverhampton TravelWise

Act TravelWise is a national campaign to promote and encourage sustainable and healthy travel choices, rather than relying on the car for all journeys. Act TravelWise helps people to consider what options other than the car might be available to them, particularly for shorter journeys.

The West Midlands TravelWise Group and Wolverhampton TravelWise work closely with Local Authorities in the Region, Centro and Public Transport Operators to improve conditions for people who walk, cycle and use public transport. Centro and Travel West Midlands are key partners in Company TravelWise and offer discounts to the employees of those organisations that sign up to the scheme.

7.8 Help2Travel

The Help2Travel website provides travel information to the public and has been developed as part of a European project for intelligent transport information systems. It provides users with a comprehensive overview of traffic & travel in the West Midlands region. It includes information about roadwork's and incidents on the region's roads, real-time train and bus information, as well as information & links to car parking, cycling and air quality information.

The system also enables up to the minute travel information to be exchanged easily between transport authorities, allowing them to respond more quickly and efficiently to travel problems.

8 Climate Change Strategies

8.1 Climate Local, Wolverhampton

Climate Local is an initiative run by the Local Government Association to support councils in reducing carbon emissions and improving resilience to the effects of climate.

In April, 2013 the leaders of the council's three political parties signed the Climate Local Wolverhampton commitment on behalf of the city council which commits the council to work to address both the causes and impacts of climate change.

8.2 Sustainability Strategy and Implementation Plan

The Sustainability Strategy and Implementation Plan will focus initially on the city council's own activities and is accompanied by an Implementation Plan that will deliver major changes. It supersedes the following documents which have been withdrawn as council policy:

- Sustainability Charter
- Wolverhampton Declaration on Climate Change
- Carbon Management Strategy and Implementation Plan
- Wolverhampton Environment Strategy
- Climate Change Strategy and Action Plan for Wolverhampton

Other strategies and action plans will remain and be reviewed and replaced as appropriate as part of the Implementation Plan.

8.3 The Black Country Joint Core Strategy

The Core Strategy identifies the main ways in which activity in The Black Country contributes towards climate change, together with ways of reducing and adapting to climate change.

8.4 The West Midlands Regional Spatial Strategy (RSS, 2004)

This strategy provides a regional strategic context for local planning decisions, and has a responsibility to help meet national targets for the reduction of greenhouse gases. The Regional Planning Body is expected to consider how the region's activities contribute towards climate change and how the region might be vulnerable to the impacts of climate change, by working with partners to develop a realistic and responsible approach to climate change in the region. This will require establishing comprehensive and up to date data in order to enable the local authorities and agencies to develop coordinated and effective solutions. Guiding principles were used in developing the Spatial Strategy to ensure that policies to assist the reduction of greenhouse gas emissions are an integral part of the West Midlands Regional Spatial Strategy.

8.5 The Wolverhampton City Strategy 2011-2026

The City Strategy 2011-2026, launched in October 2011, is the overarching strategy for the city council and the wider Wolverhampton Partnership. This superseded the Sustainable Communities Strategy. It has an overarching goal of 'Prosperity for all' with three Key Themes and priority actions relevant to sustainable development:

Theme 1: Encouraging Enterprise and Business

Theme 2: Empowering People and Communities

Theme 3: Re-invigorating the City

9 Implementation of Action Plans

The council has completed phase 1 of the interchange project. This has provided improved linkages into the bus station from the city's ring road and has significantly reduced the amount of bus traffic within the town centre. Air quality has improved significantly with the number of locations exceeding the objectives within the town centre area dropping from 18 in 2009 prior to the start of the interchange project, to 1 in 2013.

The council is working closely with the regional West Midlands group authorities to develop a low emissions strategy for the West Midlands as discussed in chapter 4 of this document.

The LETCP published the "Good Practice Air Quality Planning Guidance" in May 2014, and intends to publish a good practice guide for procurement together with an over-arching Low Emissions Strategy document in 2015. The low emissions strategy is intended to form the basis of future revisions to the action plan.

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

The Council has carried out a comprehensive review of all monitoring data gathered during 2013. Areas where the air quality objectives are not being met have been identified together with any significant trends.

10.1.1 Nitrogen dioxide data

Data collected since the previous Updating and Screening Assessment has shown that the number of locations exceeding the air quality objective for nitrogen dioxide has reduced significantly: In 2013 the following relevant locations were exceeding the objective:

Road side ISA's:

- BRO Broad Street
- Penn Road/Goldthorne Hill/Coalway Road Junction

10.1.2 PM_{10} data

A review of the collected data has shown that there have been no exceedences of the PM_{10} air quality objectives. A detailed examination of trend data has shown that there has been a significant reduction in PM_{10} concentrations in real terms over the last 10 years.

The Council has concluded that PM_{10} concentrations are meeting the air quality objectives.

10.2 Conclusions relating to New Local Developments

Wolverhampton City Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

10.3 Proposed Actions

- The review of monitoring data obtained during 2013 has not identified the need to proceed to a detailed assessment for any of the pollutants listed.
- The new monitoring data has not identified the need for any additional monitoring or changes to the existing monitoring programme.
- The new monitoring data has not identified the need for any changes to the existing AQMA.
- The council will review the PM_{10} data for a further 12 months with the intention of considering amending the AQMA in relation to this pollutant.
- Wolverhampton City Council intends to submit the 2015 Updating and Screening Report as required by the review and assessment process.

11 References

(1) Local Air Quality Management – Technical Guidance LAQM.TG(09), Department for Environment, Food and Rural Affairs 2009.

(2) Technical Guidance: Screening Assessment for Biomass Boilers, AEA Energy & Environment 2008

(3) 2012 Air Quality Updating and Screening Assessment for Wolverhampton City Council

(4) LAQM Tools; Local Air Quality Management website www.airquality.co.uk

(5) Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for laboratories and Users. Report to Defra and the Devolved Administrations ED48673043 Issue 1a Feb 2008.

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Diffusion tubes are supplied and analysed by Gradko International Ltd. and are prepared using 50% TEA in acetone. The national 2013 bias adjustment factor for the tubes obtained from the review & assessment database version number 09/14, is 1.01.

Factor from Local Co-location Studies

Triplicate tubes are exposed at the automatic monitoring stations in order to calculate a bias correction factor. The correction factor is applied to the yearly average to enable comparison with the annual NO_2 objective. The results from the co-location studies for 2013 are shown in the Table A1.1. The local bias adjustment factor for 2013 is 0.92.

Table A1.1 Chemiluminescent v's Diffusion Tube Values 2013 (µg/m^3)

Site	Mean	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	% data
Automatic Monitor Intercomparison: Diffusion Tube Values µg/m^3														
Lichfield St	**40**	39	50	50	48	39	37	43	42	39		57	33	92
Lichfield St	**39**	45	60	48	34	38	39	43	38	42	36	56	36	100
Lichfield St	**40**	47	49	46	44	38	38	45	38	44	40	56	33	100
Mean		44	53	48	42	38	38	44	39	42	38	56	34	
Standard deviation		3.9	6.1	2.0	6.9	0.7	0.8	1.2	2.0	2.1	3.0	0.6	1.5	
Coefficient of variation		8.9	11.6	4.2	16.5	1.8	2.0	2.7	5.1	5.1	7.9	1.1	4.5	
Data quality		Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	
Stafford Rd	**32**	38	44	30	34	28	28	32	34	36	36	44	38	100
Stafford Rd	**32**	38	38	31	34	35	28	32	34	37	33	47		92
Stafford Rd	**32**	39	40	36	30	31	27	31	35	34	34	45	34	100
Mean		38	41	32	32	31	28	32	34	36	34	45	36	
Standard deviation		0.6	2.6	3.3	2.4	3.3	0.7	0.4	0.6	1.2	1.5	1.2	2.6	
Coefficient of variation		1.6	6.5	10.1	7.3	10.6	2.4	1.3	1.8	3.5	4.3	2.6	7.2	
Data quality		Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	
Mean of triplicate tubes														
Lichfield St	**43**	44	53	48	42	38	38	No result	39	42	38	56	34	
Stafford Rd	**35**	38	41	32	32	31	28	32	34	36	34	45	36	
Monthly Chemiluminescent Values														
Lichfield St	**48**	55	55	34	36	34	44	No result	38	32	40	27	48	92
Stafford Rd	**36**	36		31	27	23	29	29	34	31	44	31	36	92
Ratios of diffusion Tube Values:Chemiluminescent values														
Lichfield St	**0.93**	1.09	1.04	1.15	0.82	0.94	0.90	1.01		0.92	0.85	0.71	0.78	
Stafford Rd	**0.90**	0.95	0.89		0.94	0.86	0.83	0.91	0.83	0.96	0.90	0.97	0.85	
Bias	**0.92**													

Discussion of Choice of Factor to Use

A comparison of the relevant bias adjustment factors is shown in Table A1.2. The national factors have been calculated using data from a number of authorities with tubes which will have been prepared and analysed in different batches and at different times.

The local bias adjustment factors are derived from triplicate co-located tubes exposed alongside automatic analysers at Lichfield St and Stafford Rd. These tubes are from the same batch as the measurement tubes and are handled, stored and analysed in the same way.

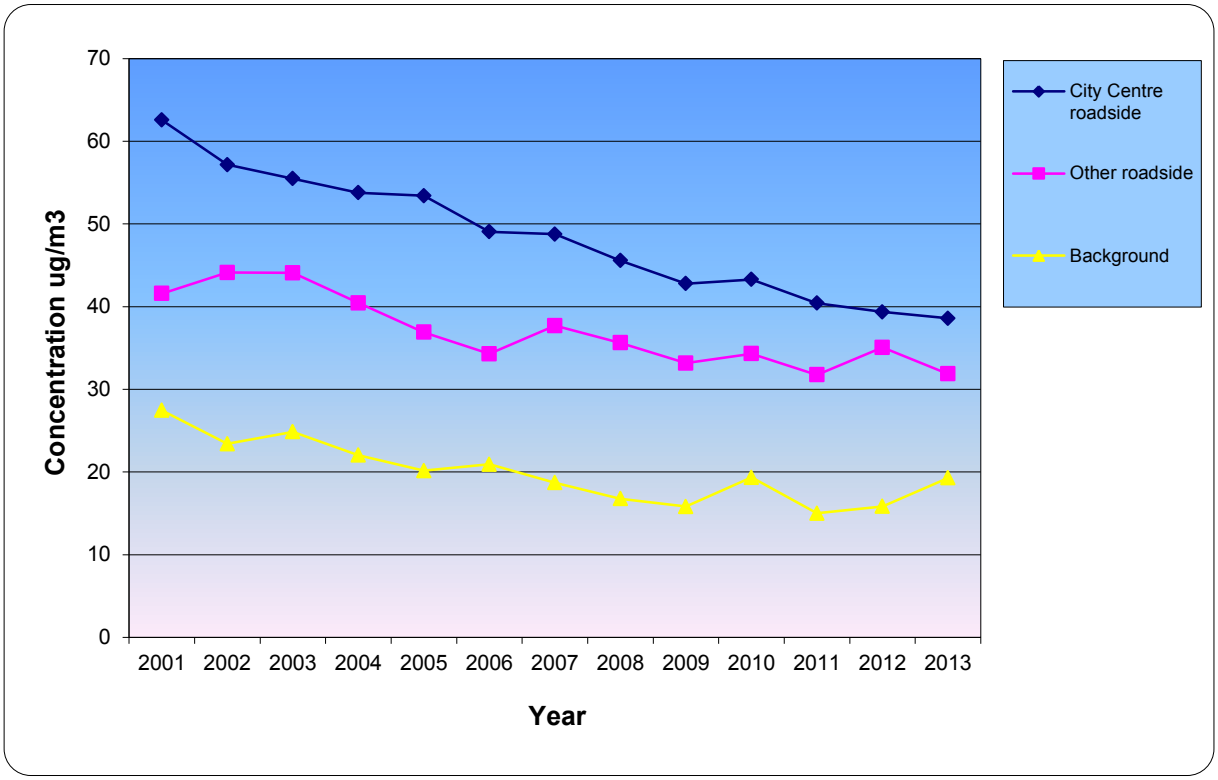
Table A1.2 National and Local Bias Adjustment Factors.

Year	National Bias Adjustment Factor	Local Bias Adjustment Factor
2001	1.45	1.01
2002	1.27	0.95
2003	1.11	0.97
2004	1.10	0.93
2005	1.10	1.00
2006	1.01	1.03
2007	0.99	0.93
2008	0.94	0.97
2009	0.97	1.08
2010	0.99	0.97
2011	0.94	0.89
2012	1.02	1.05
2013	1.01	0.92
Mean	1.07	0.98
Std	0.15	0.05

The nationally derived bias adjustment factors prior to 2006 suggest that the tubes were significantly under reading, which is not our experience at Wolverhampton. This is particularly evident in 2001 and 2002 when the tubes appeared to under read by 45% and 27% respectively.

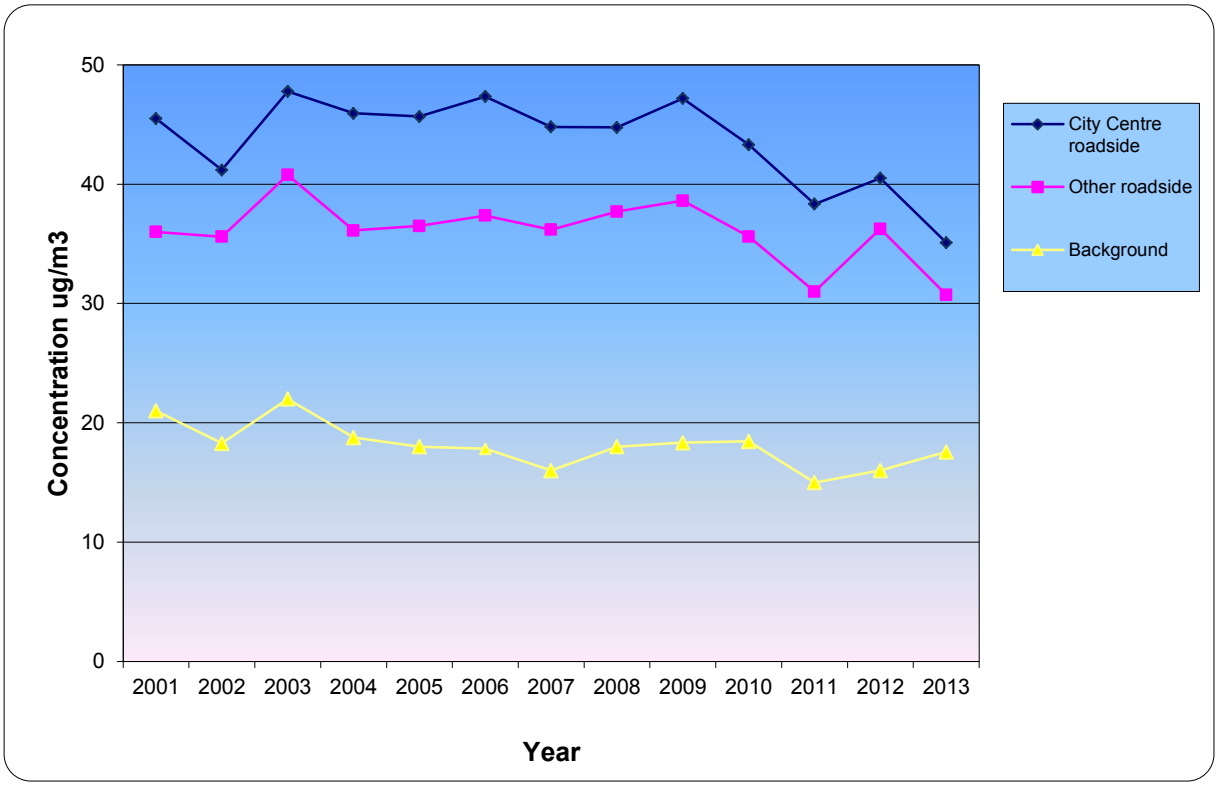
Trend data using both correction factors is presented in Figures A1.1 and A1.2. This shows that the national correction factor artificially raises the NO_2 concentrations at the start of the period, and produces an overall downward trend of between 10 and 20 $\mu g/m^3$ (Figure A1.1).

Figure A1.1 Annual Mean NO_2 Values - National Bias Adjustment Factor.



The diffusion tube NO_2 concentrations corrected with the locally derived adjustment factors (Figure A1.2) show trend data which is more consistent with the data from the automatic analysers. The locally corrected data provides better resolution and a clearer picture of NO_2 fluctuations and trends. Based on this assessment the local correction factors have been used to correct the diffusion tube data.

Figure A1.2 Annual Mean NO_2 Values - Local Bias Adjustment Factor.



PM Monitoring Adjustment

Particle monitoring is carried out using Tapered Element Oscillating Microbalance (TEOM) analysers. Data for 2009 onwards has been corrected using the volatile correction model (VCM) as required by LAQM.TG(09).

Short-term to Long-term Data adjustment

Data capture for the diffusion tube site CC6 was below the minimum requirement of 75% data capture. The results have been adjusted to provide an estimated annual mean concentration in accordance with the method outlined in Box 3.2 of the guidance manual, using data from the closest available continuous monitoring background sites. The correction factor is calculated below.

Table A.1.3 Short-Term to Long-Term Monitoring Data Adjustment for diffusion tube site ref CC6

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
Birmingham Tyburn Rd	Background urban	32.3	34.69	1.02
Birmingham Acocks Green	Background urban	31.8	27.10	1.06
Average				**1.04**

QA/QC of automatic monitoring

The chemiluminescent monitors are calibrated on a daily basis using on site calibration gases. This involves feeding a zero air gas, followed by a span gas containing a known concentration of NO_2, through the analyser. A correction factor is then applied based on the analyser's response. The calibration reports are checked on a daily basis to check for drift and the correct application of the correction factor. Data is stored in both the raw and corrected form.

A site visit is made every month to change filters and carry out a manual calibration, which is checked against the automatic daily calibrations. Copies of the calibration reports, calibration gas logs and engineer's reports are retained on file.

All the sites are covered by a service contract provided by Enviro Technology Services plc (ET). The sites are serviced every 6 months by an ET service engineer in accordance with the manufacturer's instructions and warranty conditions. ET also provide a 48-hour call out response to cover breakdowns.

The aim is to achieve 90% data capture and in order to minimise the loss of data the procedures in box A1.4: of LAQM.TG(09) have been adopted.

Raw data is examined on a daily basis to screen out spurious and unusual measurements having regard to the recommendations in Box A1.6 of LAQM.TG(09).

QA/QC of diffusion tube monitoring

Diffusion tubes are supplied and analysed by Gradko International Ltd. in accordance with the procedures set out in the harmonisation document: “Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance”.

Gradko International Ltd is a UKAS and Workplace Analysis Scheme for Proficiency (WASP) accredited laboratory and is one of a number of laboratories which take part in the UK NO_2 diffusion tube survey.

The WASP scheme involves the use of artificially spiked diffusion tubes to test the analytical performance of the laboratory on a quarterly basis. A summary of the performance in rounds 120 - 123 covering 2013 has been obtained from the Local Authority Air Quality Support web site. During this period 100% of the results submitted were determined to be **satisfactory** based upon a z-score of □± 2. The results indicate that Gradko’s analytical procedures do not have any systematic sources of bias.

The results from the nitrogen dioxide diffusion tube collocation studies for Gradko obtained from the LAQM support web site show the laboratory as generally having good precision.

Summary of Precision Results for Nitrogen Dioxide Diffusion Tube Collocation Studies, by Laboratory

The tubes arrive from Gradko and are stored in a refrigerator prior to being labelled with a site and date code. The tubes are then exposed in accordance with the start and end dates for the national NO_2 survey. Following exposure the tubes are capped and immediately dispatched to Gradko for analysis.

Triplicate tubes are exposed at the chemiluminescent monitoring stations in order to calculate bias correction which is applied to the yearly average to enable comparison with the annual NO_2 objective. The data from the duplicate and triplicate tubes covering the period of this report show that 92% of results have good precision.