



# 2009 Air Quality Updating and Screening Assessment for *St Albans District Council*

In fulfillment of Part IV of the Environment Act  
1995

Local Air Quality Management

November 2009

## St Albans District Council - England


<b>Title</b>	2009 Air Quality Updating and Screening Assessment
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## **Executive Summary**

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.

There are currently 3 AQMAs in effect in the St Albans District Council area, all of which exhibit mean NO<sub>2</sub> concentrations in 2008 which exceed the annual average Air Quality Objective (40µg·m<sup>-3</sup>). Monitoring of NO<sub>2</sub> throughout the district is done by means of diffusion tubes at 37 sites, mostly within the City of St Albans. In 2008, 11 sites recorded NO<sub>2</sub> concentrations above the annual mean objective limit for NO<sub>2</sub>, 2 of which indicate that the site may require a Detailed Assessment.

Measured concentrations of NO<sub>2</sub> at SA120 and SA121 indicate that the annual mean objective for NO<sub>2</sub> is exceeded in locations of relevant exposure in the vicinities of Mount Drive and Sleapcross Gardens. It is therefore recommended that St Albans District Council proceed to a Detailed Assessment for NO<sub>2</sub> at these two locations.

St Albans City and District Council identified two narrow congested streets, at Watson's Walk and Lattimore Road, off London road in the City Centre, east of the existing AQMA at the junction with Holywell Hill. Since it has been established by the Council that there is no relevant exposure in Watson's Walk, it is recommended that a Detailed Assessment of NO<sub>2</sub> from road traffic in the Lattimore Road area be carried out.

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# 1 Introduction

## 1.1 Description of Local Authority Area

The City and District of St Albans is located in the county of Hertfordshire, north of Greater London, and was created with the status of a city and non-metropolitan district in 1974 with an area of around 160 km<sup>2</sup>. The local authority is St Albans City and District Council, based in the City of St Albans in the south-east of the district. Major conurbations in the district are St Albans (population c. 58,000) and Harpenden (population c. 28,000), but much of the district is rural in nature.

The M25 and A414 run east-west to the south of the city, and the M1 runs north-south along the district's western extent, chiefly affecting air quality in the south and south-west areas. Luton airport, to the north of the district, and the Buncfield fuel depot, to the west, also affect air quality within the district boundaries. There are three AQMAs declared within the district, in the city centre, and to the south near the M25 and M1 motorways.

## 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.

## 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 microgrammes per cubic metre  $\mu\text{g}/\text{m}^3$  (milligrammes per cubic metre,  $\text{mg}/\text{m}^3$  for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

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**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	
<b>Benzene</b>	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
<b>1,3-Butadiene</b>	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
<b>Carbon monoxide</b>	10.0 $\text{mg}/\text{m}^3$	Running 8-hour mean	31.12.2003
<b>Lead</b>	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
<b>Nitrogen dioxide</b>	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
<b>Particles (gravimetric) (PM<sub>10</sub>)</b>	50 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
<b>Sulphur dioxide</b>	350 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005



## **1.4 Summary of Previous Review and Assessments**

St Albans City and District Council has completed all rounds of Review and Assessment of air quality to date, and has had an air quality action plan in place since December 2003. The three AQMAs in the City of St Albans have been in place since 2005, having been reviewed in 2006 and 2008.

### **1.4.1 Stage 1 Review and Assessment (December 1998)**

Assessment of road traffic sources in the district and neighbouring district concluded that PM<sub>10</sub> and NO<sub>2</sub> levels in the district may exceed the air quality objectives.

### **1.4.2 Stage 2 Review and Assessment (January 2000)**

A Stage 3 report was deemed necessary for NO<sub>2</sub> and PM<sub>10</sub> in the St Albans District Council area.

### **1.4.3 Stage 3 Review and Assessment (June 2000)**

Exceedences of the annual mean objective for NO<sub>2</sub> were considered to be likely within 100 m of the M1 and M25. As a result of this assessment six AQMAs in the St Albans District were declared, including specific residential properties close to both motorways.

### **1.4.4 Stage 4 Review and Assessment (January 2003)**

Monitoring and modelling indicated that the area of exceedence of the NO<sub>2</sub> objective was limited to properties inside AQMA 7, in Frogmore and Colney Street either side of the M25, which were found to have concentrations of 47 µg·m<sup>-3</sup>. All other AQMAs in the district (ie. numbers 1 – 4 and 6) were therefore revoked.

### **1.4.5 Updating and Screening Assessment (July 2003)**

Assessment of NO<sub>2</sub> sources indicated possible risk of exceedences at four locations which had not previously been subject to a Detailed Assessment. These were located in the city centre and adjacent to the M25, M1 and A4147, and a Detailed Assessment of NO<sub>2</sub> at these locations was therefore recommended. It was noted that no significant changes had occurred at locations studied in the Stage 4 report, and therefore that the conclusions of this report were still valid.

### **1.4.6 Air Quality Action Plan (December 2003)**

With reference to the primary objective of reducing NO<sub>2</sub> concentrations in AQMA 7, it was resolved that St Albans Council would continue to work with stakeholders to reduce pollution from the M25, and establish the possibility of creating a tree barrier. A number of actions were also proposed with reference to the secondary objective of improving air quality throughout the district, regarding alternative transport, traffic control and emission enforcement, fuel efficiency promotion and incentives, planning applications, part B processes and residential bonfires.

### **1.4.7 Detailed Assessment (March 2004)**

As recommended by the 2003 Updating and Screening Assessment, principal traffic emission sources of NO<sub>2</sub> at four locations in the district were investigated with reference to modelling and monitoring results. The report recommended that two additional AQMAs be declared, at the Peahen crossroads and adjacent to the A4147 south of junction 10 of the M1.

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### **1.4.8 Progress Report (August 2005)**

The 2005 Progress Report identified no new, or substantially changed, processes or developments in the district, and no areas in which changes in traffic flows were likely to have an effect on air quality. In addition, pollutant monitoring did not indicate any new exceedences outside an AQMA, except for ozone at the Fleetville continuous monitoring site. Since ozone is regulated as a national objective it was therefore concluded that St Albans District Council did not need to proceed to a Detailed Assessment.

### **1.4.9 Updating and Screening Assessment (July 2006)**

NO<sub>2</sub> monitoring in 2005 indicated possible exceedences of the air quality objectives at six locations in the district, three of which were within existing AQMAs. No exceedence with relevant exposure was identified at any of the other sites and therefore no changes were made to the existing AQMAs for NO<sub>2</sub>. Modelling of PM<sub>10</sub> however indicated that, whilst the 2004 annual mean objectives were likely to have been achieved, the 2010 annual and daily mean objectives were likely to be widely exceeded in that year.

### **1.4.10 Further Assessment (December 2007)**

Assessment of the three AQMAs in the district identified an additional location with NO<sub>2</sub> concentrations exceeding the annual mean objective, close to the boundary of the existing AQMA at Hollywell Hill. It was therefore recommended that a Detailed Assessment be undertaken in order that the existing AQMAs might be revised.

### **1.4.11 Detailed Assessment (December 2008)**

Detailed modelling of four areas in the district was undertaken in the light of new monitoring data and traffic counts, and the expected change in traffic conditions resulting from the new Tesco store on the A1081. On the basis of detailed modelling results it was recommended that AQMA 1 be extended to the south and west, and that additional AQMAs be declared on the east side of St Peters Street and north side of London Road across Watsons Walk<sup>1</sup>.

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<sup>1</sup> These AQMAs were not declared as it was determined that there were no residential properties within the areas of probable exceedence.

## 2 New Monitoring Data

### 2.1 Summary of Monitoring Undertaken

#### 2.1.1 Automatic Monitoring Sites

Automatic monitoring has been undertaken by St Albans District Council at Fleetville Community Centre on the A1057/Hatfield Road in the East of the City of St Albans. Data ratification and bi-weekly manual calibration is carried out by the Environmental Research Group at Kings College London (ERG) to the AURN standard. Their ratification procedure involves daily sensibility checks, monthly ratification with regard to site visits, and annual review and linear scaling based on NPL's Non-affiliate network sites audit report. To ensure consistency of the QA/QC procedure applied to all sites, ERG have developed an internal 'ratification procedures manual'. Site audits are conducted by NPL on a twice-yearly basis, in conjunction with servicing and maintenance contracted to Casella ETI. PM<sub>10</sub> data is collected by TEOM, and VCM corrected prior to publishing.

**Table 2.1 Details of Automatic Monitoring Sites**

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location ?
Fleetville Community Centre	Urban background	X 516549 Y 207391	NO <sub>2</sub> PM <sub>10</sub>	N	Y	25m	Y

#### 2.1.2 Non-Automatic Monitoring

St Albans City and District Council carry out monitoring of nitrogen dioxide by 39 diffusion tubes at 37 locations. The tubes used are analysed using the 20% TEA in water method by Gradko Ltd following the procedures set out in the Harmonisation Practical Guidance. Results from the WASP scheme indicate that Gradko Laboratories demonstrated good performance in 2008. A bias adjustment factor of 0.98 for 2008 diffusion tube results has been calculated from St Albans District Council's co-location study at the Fleetville Community Centre monitoring site.

Since the 2006 Updating & Screening Assessment, six new non-automatic monitoring sites have been set up. These sites monitor NO<sub>2</sub> concentrations around the centre of the City of St Albans in the area covered by the 2008 Detailed Modelling Assessment.

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**Table 2.2 Details of Non- Automatic Monitoring Sites**

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location ?
SA101	kerbside	X 515105 Y 207476	NO <sub>2</sub>	Y	N	-	Y
SA132	background	X 514317 Y 206453	NO <sub>2</sub>	N	Y	-	Y
SA136	background	X 514883 Y 207422	NO <sub>2</sub>	N	Y	-	Y
SA113	background	X 516634 Y 209085	NO <sub>2</sub>	N	Y	-	Y
SA104	background	X 509002 Y 211731	NO <sub>2</sub>	N	Y	-	Y
SA118	intermediate	X 518706 Y 203475	NO <sub>2</sub>	N	Y	-	Y
SA128	intermediate	X 512004 Y 202105	NO <sub>2</sub>	N	Y	-	Y
SA119	background	X 517482 Y 203881	NO <sub>2</sub>	N	Y	-	Y
SA109	kerbside	X 513345 Y 214409	NO <sub>2</sub>	N	N	-	Y
SA110	background	X 514498 Y 214382	NO <sub>2</sub>	N	Y	-	Y
SA107	background	X 510194 Y 212526	NO <sub>2</sub>	N	Y	-	Y
SA129	intermediate	X 512876 Y 202246	NO <sub>2</sub>	N	Y	-	Y
SA112	kerbside	X 517732 Y 214117	NO <sub>2</sub>	N	N	-	Y
SA111	background	X 517393 Y 213424	NO <sub>2</sub>	N	Y	-	Y
SA138	kerbside	X 514701 Y 207082	NO <sub>2</sub>	Y	N	-	Y
SA130	intermediate	X 513569 Y 204537	NO <sub>2</sub>	N	Y	-	Y
SA117	intermediate	X 517666 Y 204828	NO <sub>2</sub>	N	Y	-	Y
SA103	intermediate	X 513988 Y 208188	NO <sub>2</sub>	N	Y	-	Y
SA114	background	X 516549 Y 207391	NO <sub>2</sub>	N	Y	-	Y
SA125	roadside	X 513308 Y 202655	NO <sub>2</sub>	N	Y	-	Y
SA106	motorway	X 509432 Y 212778	NO <sub>2</sub>	N	Y	-	Y
SA105	background	X 509012 Y 213678	NO <sub>2</sub>	N	Y	-	Y
SA108	background	X 509099 Y 214068	NO <sub>2</sub>	N	Y	-	Y
SA131	background	X 511351 Y 203740	NO <sub>2</sub>	N	Y	-	Y
SA127	background	X 512570 Y 202716	NO <sub>2</sub>	N	Y	-	Y
SA126	background	X 512689 Y 202700	NO <sub>2</sub>	N	Y	-	Y
SA124	background	X 515383 Y 202528	NO <sub>2</sub>	Y	Y	-	Y
SA123	background	X 515295 Y 202765	NO <sub>2</sub>	Y	Y	-	Y

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location ?
SA122	background	X 514899 Y 203857	NO <sub>2</sub>	N	Y	-	Y
SA121	background	X 514654 Y 204546	NO <sub>2</sub>	N	Y	-	Y
SA120	background	X 516549 Y 207391	NO <sub>2</sub>	N	Y	-	Y
SA139	background	X 516549 Y 207391	NO <sub>2</sub>	N	Y	-	Y
SA137	background	X 520053 Y 206618	NO <sub>2</sub>	N	Y	-	Y
SA135	background	X 514921 Y 207391	NO <sub>2</sub>	N	Y	-	Y
SA102	roadside	X 514664 Y 207125	NO <sub>2</sub>	N	Y	-	Y
SA133	roadside	X 515096 Y 206921	NO <sub>2</sub>	N	Y	-	Y
SA134	kerbside	X 514160 Y 207694	NO <sub>2</sub>	N	Y	-	Y
SA122	kerbside	X 514606 Y 206801	NO <sub>2</sub>	N	N (20 m)	2.1	Y
SA121	kerbside	X 514648 Y 206919	NO <sub>2</sub>	N	N (4.5 m)	2.4	Y

## 2.2 Comparison of Monitoring Results with AQ Objectives

### 2.2.1 Nitrogen Dioxide

Automatic monitoring at the Fleetville Community Centre site does not indicate any exceedences of the annual mean or hourly mean objectives for NO<sub>2</sub> in the years 2006 to 2008. Data capture at the site averaged 97.4% for the year, and as such this data can be taken as sufficient evidence that no exceedences of the Air Quality Objectives for NO<sub>2</sub> have occurred at this site.

### Automatic Monitoring Data

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

Site ID	Location	Within AQMA?	Proportion of year with valid data 2008 %	Annual mean concentrations (µg/m <sup>3</sup> )		
				2006 *	2007 *	2008
A114	Fleetville Community Centre	N	97.4	26.17	23.62	23.56

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

Site ID	Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of hourly mean ( $200 \mu\text{g}/\text{m}^3$ ) <i>If the period of valid data is less than 90% of a full year, include the 99.8<sup>th</sup> %ile of hourly means in brackets.</i>		
				2006 *	2007 *	2008
SA114	Fleetville CC	N	97.4	0	0	0

### Diffusion Tube Monitoring Data

Exceedences have been noted at the following 11 monitoring locations in the district:

- **SA136** St Peters Street – No relevant exposure
- **SA128** Waterdale – Assesed in 2003, no improvement needed
- **SA138** The Peahen – In AQMA
- **SA124** Smug Oak Lane – In AQMA
- **SA123** Radlett Road – In AQMA
- **SA121** Mount Drive
- **SA120** Sleafcross Gardens
- **SA137** High Street – No relevant exposure
- **SA135** Watsons Walk – No relevant exposure
- **SA133** Belmont Hill – Kerbside
- **SA134** Albert Street – Kerbside

The monitoring site at Waterdale, Bricket Wood, near the M1, is within a revoked AQMA. In the 2003 Stage 4 assessment the area was remodelled and it was concluded that no exceedences were likely at locations of relevant exposure in Bricket Wood.

The 2008 Detailed Assessment concluded that the annual objective for  $\text{NO}_2$  would be exceeded in 2010 at locations of relevant exposure in the vicinities of the monitoring sites SA137 on High Street and SA136 on St Peters Street. However it was subsequently decided by St Albans District Council that there was no relevant exposure in these areas at locations where an exceedence of the objectives was likely.

The kerbside monitoring sites at Belmont Hill and Albert Street were considered in the 2008 Detailed Assessment based on bias adjusted measured  $\text{NO}_2$  concentrations of  $45 \mu\text{g}\cdot\text{m}^{-3}$  in 2006; it was predicted that  $\text{NO}_2$  concentrations at both sites would fall to  $37 \mu\text{g}\cdot\text{m}^{-3}$  in 2010 and the sites were therefore excluded from the recommended AQMA. New monitoring data from 2007 and 2008 indicate that levels of  $\text{NO}_2$  have fallen to less than  $45 \mu\text{g}\cdot\text{m}^{-3}$  at the kerbside. A kerbside adjustment using the methodology set out in TG(09) predicts no exceedences of the annual mean objective for  $\text{NO}_2$  at locations of relevant exposure as shown below in table 2.4.

**Table 2.4 Results of kerbside adjustment for  $\text{NO}_2$  Diffusion Tubes SA133 and SA134**

Site ID	Site name	Bias adjusted kerbside $\text{NO}_2 / \mu\text{g}\cdot\text{m}^{-3}$	$\text{NO}_2$ concentration with relevant exposure / $\mu\text{g}\cdot\text{m}^{-3}$	Kerbside adjustment reduction
SA133	Belmont Hill	44.7	34.9	22 %
SA134	Albert Street	41.5	36.4	12 %

Measured concentrations of NO<sub>2</sub> at Mount Drive and Sleapcross Gardens indicate that the annual mean objective limit for NO<sub>2</sub> in that area will be exceeded, and it is therefore recommended that St Albans District Council proceed to a Detailed Assessment for NO<sub>2</sub> at these locations.

**Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes**

2006 Site ID	2008 Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations 2008 (µg/m <sup>3</sup> ) Adjusted for bias
SA01	SA101	Hatfield Road, St Albans	N	92%	34.3
SA02	SA132	Westminster Lodge, St Albans	N	100%	22.6
<b>SA03</b>	<b>SA136</b>	<b>St Peters Street, St Albans</b>	<b>N</b>	<b>92%</b>	<b>60.4</b>
SA04	SA113	Pondfield Crescent, St Albans	N	100%	20.7
SA05	SA104	Ben Austin, Redbourn	N	100%	24.4
SA06	SA118	Barnet Rd, London Colney	N	92%	33.2
<b>SA07</b>	<b>SA128</b>	<b>Waterdale, Bricket Wd A405</b>	<b>N</b>	<b>100%</b>	<b>42.1</b>
SA08	SA119	Bowmans JMI, London Colney	N	100%	30.6
SA09	SA109	High Street, Harpenden	N	100%	36.9
SA10	SA110	Crabtree JMI, Harpenden	N	100%	22.4
SA11	SA107	Redbourn JMI, Redbourn	N	92%	23.4
SA12	SA129	Ashridge Drive, Bricket Wood	N	100%	24.7
SA13	SA112	High Street, Wheathampstead	N	100%	26.2
SA14	SA111	Butterfield Rd, Wheathampstead	N	100%	20.8
<b>SA15</b>	<b>SA138</b>	<b>The Peahen, St Albans</b>	<b>Y</b>	<b>100%</b>	<b>57.6</b>
SA16	SA130	Tippendell Lane, Chiswell Green	N	100%	32.3
SA17	SA117	Five Acres, London Colney	N	100%	33.4
SA18	SA103	Links View, St Albans	N	100%	25.3
SA20	SA114	Fleetville Community Centre	N	100%	22.8
SA21	SA125	Lye Lane, Bricket Wood	N	100%	38.4
SA22	SA106	Lybury Lane, Redbourn	N	100%	37.7
SA23	SA105	St Agnells, Lybury Lane, Redbourn	N	100%	22.1
SA24	SA108	Redding Lane, Redbourn	N	<b>83%</b>	25.9
SA25	SA131	Farm Searches Lane, Bedmond	N	100%	30.3
SA26	SA127	Oakwood Road, Bricket Wood	N	92%	31.9
SA27	SA126	Five Acres Avenue, Bricket Wood	N	100%	32.6
<b>SA30</b>	<b>SA124</b>	<b>Smug Oak Lane, Bricket Wood</b>	<b>Y</b>	<b>100%</b>	<b>44.3</b>
<b>SA31</b>	<b>SA123</b>	<b>Radlett Road, Park Street</b>	<b>Y</b>	<b>100%</b>	<b>42.2</b>
SA32	SA122	Sycamore Drive, Park Street	N	100%	35.2
<b>SA33</b>	<b>SA121</b>	<b>Mount Drive, Park Street</b>	<b>N</b>	<b>100%</b>	<b>42.8</b>
<b>SA37</b>	<b>SA120</b>	<b>Sleapcross Gardens, Smallford</b>	<b>N</b>	<b>100%</b>	<b>40.6</b>
SA38	SA139	Civic Centre, St Albans	N	100%	27.3
<b>SA39</b>	<b>SA137</b>	<b>High Street, St Albans</b>	<b>N</b>	<b>100%</b>	<b>49.4</b>
<b>SA40</b>	<b>SA135</b>	<b>Watsons Walk, St Albans</b>	<b>N</b>	<b>100%</b>	<b>48.6</b>
SA41	SA102	Folly Lane, St Albans	N	92%	37.0
<b>SA42</b>	<b>SA133</b>	<b>Belmont Hill, St Albans</b>	<b>N</b>	<b>100%</b>	<b>44.7</b>
<b>SA43</b>	<b>SA134</b>	<b>Albert Street, St Albans</b>	<b>N</b>	<b>100%</b>	<b>41.5</b>

## St Albans District Council

Table 2.4b Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Adjusted for bias		
			2006 *	2007 *	2008
SA101	Hatfield Road, St Albans	N	35.2	37.1	34.3
SA132	Westminster Lodge, St Albans	N	25.6	23.9	22.6
<b>SA136</b>	<b>St Peters Street, St Albans</b>	<b>N</b>	<b>54.9</b>	<b>57.0</b>	<b>60.4</b>
SA113	Pondfield Crescent, St Albans	N	22.3	21.7	20.7
SA104	Ben Austin, Redbourn	N	23.2	23.8	24.4
SA118	Barnet Rd, London Colney	N	31.4	32.4	33.2
<b>SA128</b>	<b>Waterdale, Bricket Wd A405</b>	<b>N</b>	<b>39.7</b>	<b>43.8</b>	<b>42.1</b>
SA119	Bowmans JMI, London Colney	N	30.2	31.5	30.6
SA109	High Street, Harpenden	N	36.9	39.0	36.9
SA110	Crabtree JMI, Harpenden	N	23.3	23.2	22.4
SA107	Redbourn JMI, Redbourn	N	23.9	23.9	23.4
SA129	Ashridge Drive, Bricket Wood	N	29.1	28.6	24.7
SA112	High Street, Wheathampstead	N	27.2	26.2	26.2
SA111	Butterfield Rd, Wheathampstead	N	22.5	21.6	20.8
<b>SA138</b>	<b>The Peahen, St Albans</b>	<b>Y</b>	<b>50.5</b>	<b>55.7</b>	<b>57.6</b>
SA130	Tippendell Lane, Chiswell Green	N	31.0	32.6	32.3
SA117	Five Acres, London Colney	N	33.0	34.1	33.4
SA103	Links View, St Albans	N	24.6	25.3	25.3
SA114	Fleetville Community Centre	N	25.9	23.3	22.8
SA125	Lye Lane, Bricket Wood	N	35.7	33.4	38.4
SA106	Lybury Lane, Redbourn	N	<b>41.7</b>	37.5	37.7
SA105	St Agnells, Lybury Lane, Redbourn	N	23.9	22.4	22.1
SA108	Redding Lane, Redbourn	N	27.4	26.6	25.9
SA131	Farm Searches Lane, Bedmond	N	30.9	29.9	30.3
SA127	Oakwood Road, Bricket Wood	N	33.2	33.5	31.9
SA126	Five Acres Avenue, Bricket Wood	N	27.7	30.0	32.6
<b>SA124</b>	<b>Smug Oak Lane, Bricket Wood</b>	<b>Y</b>	<b>40.8</b>	<b>46.9</b>	<b>44.3</b>
<b>SA123</b>	<b>Radlett Road, Park Street</b>	<b>Y</b>	39.0	<b>43.3</b>	<b>42.2</b>
SA122	Sycamore Drive, Park Street	N	33.4	33.9	35.2
<b>SA121</b>	<b>Mount Drive, Park Street</b>	<b>N</b>	39.7	<b>46.8</b>	<b>42.8</b>
<b>SA120</b>	<b>Sleapcross Gardens, Smallford</b>	<b>N</b>	37.1	35.9	<b>40.6</b>
SA139	Civic Centre, St Albans	N	29.1	29.5	27.3
<b>SA137</b>	<b>High Street, St Albans</b>	<b>N</b>	<b>45.2</b>	<b>49.8</b>	<b>49.4</b>
<b>SA135</b>	<b>Watsons Walk, St Albans</b>	<b>N</b>	<b>45.9</b>	<b>51.7</b>	<b>48.6</b>
SA102	Folly Lane, St Albans	N	35.6	37.6	37.0
<b>SA133</b>	<b>Belmont Hill, St Albans</b>	<b>N</b>	-	<b>41.8</b>	<b>44.7</b>
<b>SA134</b>	<b>Albert Street, St Albans</b>	<b>N</b>	-	<b>41.6</b>	<b>41.5</b>

### 2.2.2 PM<sub>10</sub>

PM<sub>10</sub> concentrations measured by the Automatic monitoring site at Fleetville Community Centre were well below the annual and 24-hour mean objectives from 2006 to 2008. The number of exceedences of the daily mean objective was well below the maximum permitted for all years. Data capture at the site was 98.8% for the year, and it can therefore be concluded that no exceedence of the Air Quality Objectives for PM<sub>10</sub> occurred at this site in 2008.



Table 2.5a Results of PM<sub>10</sub> Automatic Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations (µg/m <sup>3</sup> )		
				2006 *	2007 *	2008
SA114	Fleetville CC	N	98.8	17.59	16.10	14.23

Table 2.5b Results of PM<sub>10</sub> Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of daily mean objective (50 µg/m <sup>3</sup> ) <i>If data capture &lt; 90%, include the 90<sup>th</sup> %ile of daily means in brackets.</i>		
				2006 *	2007 *	2008
SA114	Fleetville CC	N	98.8	3	6	2

### 2.2.3 Sulphur Dioxide

No monitoring of SO<sub>2</sub> has been undertaken by St Albans District Council in 2008.

### 2.2.4 Benzene

No monitoring of benzene has been undertaken by St Albans District Council in 2008.

### 2.2.5 Other pollutants monitored

The automatic monitoring station at Fleetville community centre measured ambient ozone concentrations in 2008 with a data capture success rate of 99.04%, finding the annual average concentration as 22.08 ppb. There were 29 days when the maximum rolling 8-hr mean exceeded 100 µg·m<sup>-3</sup>, exceeding the UK Air Quality Objective of 10 days; however since control of ozone is not the responsibility of local authorities, no action need be taken.

St Albans District Council has measured concentrations of NO<sub>2</sub> above the annual mean objective at relevant locations, and **will need to proceed to a Detailed Assessment** for the areas of Park Street near the junctions with Sleafcross Gardens and with Mount Drive.

## **3 Road Traffic Sources**

### **3.1 Narrow Congested Streets with Residential Properties Close to the Kerb**

St Albans City and District Council identified two narrow congested streets with AADT flow of greater than 5000 vehicles, and average speed below 25 km/h, with relevant exposure. These were Watson's Walk and Lattimore Road, off London Road in the City Centre, east of the existing AQMA at the junction with Holywell Hill.

The 2008 Detailed Assessment investigated NO<sub>2</sub> concentrations in the Watson's Walk area and recommended that the council should consider declaring an AQMA covering the properties located to the north side of London Road across Watson's Walk. However, it was subsequently decided that there was no relevant exposure in the Watson's Walk area, and it was therefore excluded from the AQMA; correspondingly a Detailed Assessment should consider only Lattimore Road, and not Watson's Walk.

St Albans District Council has identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, not adequately considered in previous rounds of Review and Assessment, and **will need to proceed to a Detailed Assessment**.

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

Areas requiring assessment under this section must have regular public exposure within 5 m of a main road. Occupational exposure is not considered under this section, and therefore such areas are most likely to be shopping streets, or streets with outdoor kerbside restaurant or café areas.

St Albans District 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.**

Roads carrying in excess of 2,500 heavy duty vehicles per day are considered to be a potential hazard, if located within 10 m of relevant public exposure, due to increased NO<sub>2</sub> and PM<sub>10</sub> levels. Such roads may not necessarily have a high AADT flow, but may include bus-only streets or industrial estate feed roads, with an unusually high proportion of heavy duty traffic.

St Albans District Council confirms that there are no new/newly identified roads with high flows of buses/HGVs.

### **3.4 Junctions**

Concentrations of NO<sub>2</sub> and PM<sub>10</sub> can be especially high near busy junctions, due to combined impact of congested traffic on two intersecting major roads. However, there are no junctions in the St Albans City & District area which are busy enough to warrant assessment.

St Albans District 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**

Assessment of new roads is warranted, where an environmental impact assessment has not previously been carried out, if the road has high traffic flow and/or increases traffic flow on existing roads with NO<sub>2</sub> concentrations close to the national objectives.

St Albans District Council confirms that there are no new/proposed roads.

### **3.6 Roads with Significantly Changed Traffic Flows**

A busy road may be considered to have significantly changed traffic flows if AADT data exhibits an increase in traffic flow greater than 25%, whether due to an actual increase or an improvement in data accuracy. If it is at risk of exceeding air quality objectives for NO<sub>2</sub> or PM<sub>10</sub> at a relevant location then an assessment may be necessary.

St Albans District Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

### **3.7 Bus and Coach Stations**

Stations must be considered for assessment if they are unenclosed and within 10 m of relevant public exposure. In such cases it is considered that the site may have a significant detrimental effect on local air quality, with respect to NO<sub>2</sub>, if there are more than 2,500 bus movements per day.

St Albans District Council confirms that there are no relevant bus stations in the Local Authority area.

## **4 Other Transport Sources**

### **4.1 Airports**

New information since the last round of Review and Assessment has led to a relaxing of assessment criteria with respect to NO<sub>2</sub>, and the criteria for assessment of PM<sub>10</sub> being removed. The closest airport to St Albans District is Luton Airport, located approximately 2.5 km north of the northern district boundary. Since relevant exposure is assessed within 1000 m of the airport boundary there is no screening requirement for emissions from the airport.

St Albans District Council confirms that there are no airports in the Local Authority area.

### **4.2 Railways (Diesel and Steam Trains)**

St Albans District Council has identified no possible exceedences of the Air Quality Objectives from rail sources in the district.

#### **4.2.1 Stationary Trains**

New evidence has been noted in 2009 guidance that NO<sub>2</sub> concentrations alongside busy rail lines carrying coal or diesel locomotives can be elevated to a similar extent as on a busy road. Where background NO<sub>2</sub> concentrations exceed 25 µg·m<sup>-3</sup>, and there is relevant exposure within 15 m of the tracks, an assessment may be necessary if volumes of rail traffic are considered sufficiently large.

St Albans District 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**

As in previous rounds of Review and Assessment, no rail tracks in the St Albans District have sufficient diesel locomotive activity to warrant screening of NO<sub>2</sub> emissions.

St Albans District 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)**

There are no major waterways passing through, or near, the St Albans District and hence there can be no requirement for screening of SO<sub>2</sub> emissions from shipping activities.

St Albans District 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

Whilst individual industrial installations are unlikely to have a significant impact on local air quality, if the area is already at risk of exceeding air quality objectives, especially those for SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub> and benzene, then contributions from one source, or several in the same locality, may result in an exceedance of the Air Quality Objectives.

#### 5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

St Albans District 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

St Albans District 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

St Albans District 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

Major petrol fuel storage depots can emit substantial levels of benzene which, when combined with emissions from nearby roads, may present a risk of exceeding the 2010 Air Quality Objectives. Whilst there are no such sites within the district, the Hertfordshire Oil Storage Ltd. site, in the Buncefield Complex on the eastern side of Hemel Hempstead, is situated on the district's western boundary. Following an explosion in 2005, the site was inactive until October 2007 when Total was permitted to begin refurbishment and commence operations on the eastern site; the western site remains inactive at the time of writing.

Measurements by diffusion tube at Cherry Tree Farm, located within 1 km of the Buncefield site, shortly before the 2005 fire indicated a maximum monthly average benzene concentration of 1.2 µg·m<sup>-3</sup>. This is well below the maximum permissible annual mean concentration of 5 µg·m<sup>-3</sup> legislated by the 2010 Air Quality Objectives. However, as noted in the 2006 USA, the service station at junction 8 of the M1 may represent relevant exposure within 250 m of the site boundary, and continued monitoring at this or a similar location is therefore recommended.

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

### **5.3 Petrol Stations**

Petrol stations with a high annual petrol throughput may, when combined with emissions from nearby busy roads, emit sufficient benzene to risk exceeding the 2010 objectives. A petrol station is therefore considered for further assessment if its annual throughput exceeds two million litres, it is close to a road with AADT greater than 30,000 vehicles, and has relevant exposure within 10m of the pumps.

St Albans District Council confirms that there are no petrol stations meeting the specified criteria.

### **5.4 Poultry Farms**

Changes to the Local Air Quality Management guidance notes for 2009 require all Local Authorities to consider PM<sub>10</sub> emissions from poultry farms with regard to the 2010 Air Quality Objectives. Large farms are therefore considered for further assessment if they are deemed to have relevant exposure within 100 m of any poultry units.

St Albans District Council confirms that there are no poultry farms meeting the specified criteria.

## 6 Commercial and Domestic Sources

### 6.1 Biomass Combustion – Individual Installations

Biomass combustion may often lead to an increase in local PM<sub>10</sub> and NO<sub>x</sub> concentrations, over and above that expected from conventional gas burning. Plants with power greater than 50 kW are therefore considered for further assessment based on the emission height and rate, and the locations and dimensions of surrounding buildings.

St Albans District Council confirms that there are no biomass combustion plants in the Local Authority area.

### 6.2 Biomass Combustion – Combined Impacts

In areas where there is a high density of biomass combustion, from industrial, commercial or domestic sources, there is a potential for exceedence of the 2010 objective for PM<sub>10</sub>. Such areas are therefore assessed at a resolution of 500 m based on the density and type of combustion appliances.

St Albans District Council confirms that there are no areas of significant biomass combustion in the Local Authority area.

### 6.3 Domestic Solid-Fuel Burning

In areas where coal or smokeless fuel is used as the primary source of heating for a significant number of properties there is likely to be an effect on local SO<sub>2</sub> concentrations, in addition to PM<sub>10</sub> as previously noted. Areas are therefore considered for further assessment if the density of properties primarily burning coal exceeds 200 km<sup>-2</sup> in any 500 m square (ie. approximately 7%).

St Albans District Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

## **7 Fugitive or Uncontrolled Sources**

This section considers sites of long term activity where high levels of dust and PM<sub>10</sub> are likely to arise from activities other than industrial processes or combustion, such as controlled detonations or vehicle movements. Activities such as quarrying, materials or waste handling, and construction works have been known to give rise to elevated dust levels up to 1 km from the site boundary, potentially jeopardising achievement of the Air Quality Objective for PM<sub>10</sub>.

St Albans District Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.



## 8 Conclusions and Proposed Actions

### 8.1 Conclusions from New Monitoring Data

The following 11 non-automatic monitoring sites recorded local annual average NO<sub>2</sub> concentrations in 2008 which exceeded the AQS objective of 40 µg·m<sup>-3</sup>:

**Table 8.1 – Measured exceedences of the Air Quality Objectives for NO<sub>2</sub>**

Site ID	Location	Description	Bias adjusted annual mean / NO <sub>2</sub> µg·m <sup>-3</sup>
SA136	St Peters Street	No relevant exposure	60.4
SA128	Waterdale	Assessed in 2003, no improvement needed	42.1
SA138	The Peahen	AQMA 1	57.6
SA123	Radlett Road	AQMA 7	42.2
SA121	Mount Drive	Background	42.8
SA120	Sleapcross Gardens	Background	40.6
SA137	High Street	No relevant exposure	49.4
SA135	Watson's Walk	No relevant exposure	48.6
SA133	Belmont Hill	Kerbside	44.7 (34.9)
SA134	Albert Street	Kerbside	41.5 (36.4)

Of these 11 locations, two are within existing AQMAs, three have no associated relevant exposure. Levels of NO<sub>2</sub> at the SA128 site were investigated in the 2003 Stage 4 report and it was concluded that no improvement was necessary.

The kerbside monitoring sites at Belmont Hill and Albert Street were considered in the 2008 Detailed Assessment based on bias adjusted measured NO<sub>2</sub> concentrations of 45 µg·m<sup>-3</sup> in 2006; it was predicted that NO<sub>2</sub> concentrations at both sites would fall to 37 µg·m<sup>-3</sup> in 2010 and the sites were therefore excluded from the recommended AQMA. New monitoring data from 2007 and 2008 indicate that levels of NO<sub>2</sub> have fallen to less than 45 µg·m<sup>-3</sup> at the kerbside. A kerbside adjustment predicts no exceedences of the annual mean objective for NO<sub>2</sub> at locations of relevant exposure.

Measured concentrations of NO<sub>2</sub> at Mount Drive and Sleapcross Gardens indicate that the annual mean objective for NO<sub>2</sub> will be exceeded. It is therefore recommended that St Albans District Council proceed to a Detailed Assessment for NO<sub>2</sub> at these locations.

### 8.2 Conclusions from Assessment of Sources

The majority of sources in the St Albans District area have not changed significantly since the last Review and Assessment. However changes in the guidance criteria for narrow congested streets have highlighted the need for a Detailed Assessment covering Lattimore Road.

The Hertfordshire Oil Storage Ltd. site, in the Buncefield Complex on the eastern side of Hemel Hempstead, is situated on the western boundary of the St Albans District. Following an explosion in 2005, the site was inactive until October 2007 when Total was permitted to begin refurbishment and commence operations on the eastern site; the western site remains inactive at the time of writing. Measurements of benzene within 1 km of the Buncefield site shortly before the 2005 fire indicated a maximum monthly average benzene concentration of 1.2 µg·m<sup>-3</sup>. This is well below the maximum permissible annual mean concentration of 5 µg·m<sup>-3</sup> legislated by the 2010 Air Quality Objectives. However, as noted in the 2006 USA, the service station at junction 8 of the M1 may represent relevant

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exposure within 250 m of the site boundary, and continued monitoring at this or a similar location is therefore recommended.

### **8.3 Proposed Actions**

It is recommended that St Albans District Council proceed to a Detailed Assessment for NO<sub>2</sub> in the vicinity of the diffusion tube sites SA120 and SA121, based on exceedences of the annual mean objective recorded at the sites during 2008. In addition it is recommended that a Detailed Assessment be conducted for NO<sub>2</sub> in the vicinity of Lattimore Road due to the high recorded AADT there. This assessment should be based on the annual mean objective, but should also consider the hourly mean objective for NO<sub>2</sub>.

## 9 References

Air Quality Consultants Ltd Spreadsheet of Bias Adjustment Factors (v.03/09) accessed on the Review & Assessment Helpdesk website (<http://www.uwe.ac.uk/aqm/review/R&Asupport/diffusiontube310309.xls>)

Air Quality Review and Assessment – Stage 4 (2003), AEA Technology plc., Report AEAT/ENV/R/1395

Air Quality Review and Assessment – Air Quality Action Plan (2003), N.Egerton Report NJE/AQAP1

Air Quality Review and Assessment – Detailed (2004), AEA Technology plc., Report AEAT/ENV/R/1676

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Air Quality Updating and Screening Assessment (2006), AEA Technology plc., Report AEAT/ENV/R/2183

Air Quality Review and Assessment – Further Assessment (2007), AEA Technology plc., Report AEAT/ENV/R/2553

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DEFRA (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Department of the Environment, Transport and the Regions. Cm 7169, NIA 61/06-07

Department for Environment, Food and Rural Affairs, (2009) Part IV of the Environment Act 1995. Local Air Quality Management Technical Guidance LAQM.TG(09). February 2009

DifTPrecisionAccuracyBias Spreadsheet (Version AEA\_DifTPAB\_v02.xls) accessed on the UK Air Quality Achieve website ([http://www.airquality.co.uk/archive/laqm/tools/AEA\\_DifTPAB\\_v03](http://www.airquality.co.uk/archive/laqm/tools/AEA_DifTPAB_v03))

Herts and Beds Air Pollution Monitoring Network: Annual Report 2007 (May 2008) Environmental Research Group, King's College London

The Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043),

The Stationery Office (1995) The Environment Act 1995: Part IV

UK National Air Quality Information Archive, accessed at [www.airquality.co.uk](http://www.airquality.co.uk),

UK National Air Quality Information Archive, UK background concentrations of NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub>, Download CSV Format Background Maps for 2006 to 2020 accessed on the UK Air Quality Achieve website (<http://www.airquality.co.uk/archive/laqm/tools.php?tool=background06>)

UK National Air Quality Information Archive (2009) Monitoring data from AURN Sites ([www.airquality.co.uk](http://www.airquality.co.uk))

*St Albans District Council*

# **Appendices**

Appendix A: QA/QC Data

# Appendix A: QA:QC Data

## Diffusion Tube Bias Adjustment Factors

The R&A Helpdesk Database gives a bias adjustment factor of 0.92 for NO<sub>2</sub> diffusion tubes analysed by Gradko Laboratories. However this has not been used in this assessment since St Albans District Council has conducted a co-location study at the Fleetville Community Centre automatic monitoring site.

Fig 1. Bias factors from R&A Helpdesk website

Follow the steps below <b>in the correct order</b> to show the results of <b>relevant</b> co-location studies							Spreadsheet Version Number: 03.09			
<b>Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods</b>							This spreadsheet will be updated in late September 2009 on the <a href="#">R&amp;A website</a>			
<b>Whenever presenting adjusted data, you should state the adjustment factor used</b>							Published by Air Quality Consultants Ltd on behalf of Defra, the Welsh Assembly Government, the Scottish Government and the Department of the Environment Northern Ireland			
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.										
Step 1:	Step 2:	Step 3:	Step 4:							
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor <sup>3</sup> shown in blue at the foot of the final column.							
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data <sup>2</sup> .	If you have your own co-location study then see footnote <sup>4</sup> . If uncertain what to do then contact the Review and Assessment Helpdesk 0117 328 3668 aqm-review@uwe.ac.uk.							
Analysed By <sup>1</sup>	Method <sup>2</sup>	Year <sup>2</sup>	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m <sup>3</sup> )	Automatic Monitor Mean Conc. (Cm) (µg/m <sup>3</sup> )	Bias (B)	Tube Precision <sup>5</sup>	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in Water	2008	UC	Belfast CC	11	41	33	26.7%	G	0.79
Gradko	20% TEA in Water	2008	R	Crewe and Nantwich BC	10	33	32	4.2%	G	0.96
Gradko	20% TEA in Water	2008	R	Dudley MBC	12	49	42	17.6%	G	0.85
Gradko	20% TEA in Water	2008	B	Dudley MBC	12	30	28	6.9%	P	0.94
Gradko	20% TEA in Water	2008	Rural	Dudley MBC	12	18	17	4.7%	G	0.96
Gradko	20% TEA in Water	2008	R	Ellesmere Port & Neston BC	12	45	42	7.4%	G	0.93
Gradko	20% TEA in Water	2008	R	Rhondda Cynon Taf CBC	12	35	35	0.0%	G	1.00
Gradko	20% TEA in Water	2008	R	South Hams DC	10	41	40	2.6%	G	0.97
Gradko	20% TEA in Water	2008	R	Rushmoor BC	12	42	38	9.3%	G	0.91
Gradko	20% TEA in Water	2008	K	AEA Tech Intercomparison	12	117	116	1.2%	G	0.99
Gradko	20% TEA in Water	2008	R	Blackburn with Darwen BC	12	31	26	19.5%	P	0.84
Gradko	20% TEA in Water	2008								<b>Overall Factor<sup>3</sup> (11 studies)</b>
									<b>Use</b>	<b>0.92</b>

<sup>1</sup> For Casella Stanger/Bureau Veritas (NOT Bureau Veritas Labs) use Gradko 50% TEA in Acetone; for Bureau Veritas Labs and Eurofins use Casella Seal/GMSS/Casella CRE/Bureau Veritas Labs/Eurofins; for Staffordshire County Analyst use Staffordshire CC SS; for Bodycote Health Sciences use Clyde Analytical Laboratories. From 2008 Dundee CC are Tayside SS.

<sup>2</sup> In this situation it would be reasonable to use data from the nearest year.

<sup>3</sup> Overall factors have been calculated using orthogonal regression to allow for uncertainty in both the automatic monitor and diffusion tube. The uncertainty of the diffusion tube has been assumed to be double that of the automatic monitor.

<sup>4</sup> If you have your own co-location study, please send your data to us, so that it can be included here. If this is not possible, but you wish to combine these factors with your own, select and copy the relevant data from this spreadsheet and paste them into a new one (otherwise your calculations will include hidden data). Then add your own data and calculate the bias. To obtain a new correction factor that includes your data, average the bias (B) values, expressed as a factor, i.e. -16% is -0.16. Next add 1 to this value, e.g. -0.16 + 1.00 = 0.84 in this example, then take the inverse to give the bias adjustment factor 1/0.84 = 1.19. (This will not be exactly the same as the correction factor calculated using orthogonal regression as used in this spreadsheet, but will be reasonably close).

<sup>5</sup> Where an annual data set falls into two years it has been ascribed to the year in which most of the data fall.

<sup>6</sup> Tube precision is determined as follows: G = Good precision - coefficient of variation (CV) of diffusion tube replicates is considered good when the CV of eight or more periods is less than 20%, and the average CV of all monitoring periods is less than 10%; P = Poor precision - CV of four or more periods >20% and/or average CV >10%; S = Single tube, therefore not applicable; na = not available.

## Factor from Local Co-location Studies (if available)

The co-location study at Fleetville Community Centre allowed for the calculation of a local bias adjustment factor for NO<sub>2</sub> diffusion tubes in the St Albans City and District Council area. This data implies a bias adjustment factor of 0.98 for NO<sub>2</sub> diffusion tube results from 2008 as shown below.

Fig 2. Bias factor from local co-location study

Checking Precision and Accuracy of Triplicate Tubes										netcen			
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Diffusion Tubes Measurements						Automatic Method		Data Quality Check		
			Tube 1 $\mu\text{g}\cdot\text{m}^{-3}$	Tube 2 $\mu\text{g}\cdot\text{m}^{-3}$	Tube 3 $\mu\text{g}\cdot\text{m}^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data Capture Check
1	01/01/2008	31/01/2008	31.0	29.0	30.0	30	1.0	3	2.5	28.04	98.25	Good	Good
2	01/02/2008	29/02/2008	42.0	31.0	37.0	37	5.5	15	13.7	40.17	99.14	Good	Good
3	01/03/2008	31/03/2008	22.0	22.0	24.0	23	1.2	5	2.9	21.51	98.79	Good	Good
4	01/04/2008	30/04/2008	21.0	22.0	20.0	21	1.0	5	2.5	24.21	99.44	Good	Good
5	01/05/2008	31/05/2008	19.0	20.0	20.0	20	0.6	3	1.4	17.54	98.12	Good	Good
6	01/06/2008	30/06/2008	16.0	17.0	16.0	16	0.6	4	1.4	13.55	97.64	Good	Good
7	01/07/2008	31/07/2008	15.0	17.0	18.0	17	1.5	9	3.8	16.73	94.09	Good	Good
8	01/08/2008	31/08/2008	20.0	20.0	20.0	20	0.0	0	0.0	14.30	97.98	Good	Good
9	01/09/2008	30/09/2008	18.0	14.0	18.0	17	2.3	14	5.7	23.60	99.31	Good	Good
10	01/10/2008	31/10/2008	20.0	28.0	29.0	26	4.9	19	12.3	25.23	99.06	Good	Good
11	01/11/2008	30/11/2008	30.0	30.0	32.0	31	1.2	4	2.9	25.08	88.19	Good	Good
12	01/12/2008	31/12/2008	32.0	33.0	34.0	33	1.0	3	2.5	33.39	96.37	Good	Good
13													

**It is necessary to have results for at least two tubes in order to calculate the precision of the measurements**

Overall survey --> **Good precision** **Good Overall DC** (Check average CV & DC from Accuracy calculations)

Site Name/ID: Fleetville	Precision 12 out of 12 periods have a CV smaller than 20%
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**Accuracy (with 95% confidence interval)**  
without periods with CV larger than 20%

Bias calculated using 12 periods of data  
**Bias factor A 0.98 (0.88 - 1.11)**  
**Bias B 2% (-10% - 14%)**

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Diffusion Tubes Mean: 24  $\mu\text{g}\cdot\text{m}^{-3}$   
Mean CV (Precision): 7

Automatic Mean: 24  $\mu\text{g}\cdot\text{m}^{-3}$   
Data Capture for periods used: 97.198546

Adjusted Tubes Mean: 24 [21 - 27]  $\mu\text{g}\cdot\text{m}^{-3}$

**Accuracy (with 95% confidence interval)**  
WITH ALL DATA

Bias calculated using 12 periods of data  
**Bias factor A 0.98 (0.88 - 1.11)**  
**Bias B 2% (-10% - 14%)**

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Diffusion Tubes Mean: 24  $\mu\text{g}\cdot\text{m}^{-3}$   
Mean CV (Precision): 7

Automatic Mean: 24  $\mu\text{g}\cdot\text{m}^{-3}$   
Data Capture for periods used: 97.198

Adjusted Tubes Mean: 24 [21 - 27]  $\mu\text{g}\cdot\text{m}^{-3}$

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Version 02 - April 2006

### Discussion of Choice of Factor to Use

In order to ensure that NO<sub>2</sub> concentrations at monitoring locations are not underestimated, the more conservative factor of 0.98, from St Albans District Council's co-location study, has been used throughout this assessment. Since the automatic monitor and diffusion tube data have good precision it is likely that the local bias adjustment factor is more accurate than that given in the R&A helpdesk website.

Site ID	Pre-adjustment NO <sub>2</sub> / $\mu\text{g}\cdot\text{m}^{-3}$	Bias adjusted NO <sub>2</sub> / $\mu\text{g}\cdot\text{m}^{-3}$	Data capture
SA101	35.0	34.3	92%
SA102	37.7	37.0	100%
SA103	25.8	25.3	92%
SA104	24.9	24.4	100%
SA105	22.5	22.1	100%
SA106	38.5	37.7	92%
SA107	23.9	23.4	100%
SA108	26.5	25.9	100%
SA109	37.6	36.9	100%
SA110	22.8	22.4	100%
SA111	21.2	20.8	92%
SA112	26.7	26.2	100%
SA113	21.1	20.7	100%
SA114	23.1	22.6	100%
SA115	22.7	22.3	100%
SA116	24.0	23.5	100%
SA117	34.1	33.4	100%
SA118	33.9	33.2	100%
SA119	31.2	30.6	100%
SA120	41.5	40.6	100%
SA121	43.6	42.8	100%

SA122	35.9	35.2	83%
SA123	43.1	42.2	100%
SA124	45.2	44.3	92%
SA125	39.2	38.4	100%
SA126	33.3	32.6	100%
SA127	32.5	31.9	100%
SA128	43.0	42.1	100%
SA129	25.2	24.7	100%
SA130	32.9	32.3	100%
SA131	30.9	30.3	100%
SA132	23.1	22.6	100%
SA133	45.6	44.7	100%
SA134	42.3	41.5	92%
SA135	49.6	48.6	100%
SA136	61.6	60.4	100%
SA137	50.5	49.4	100%
SA138	58.8	57.6	100%
SA139	27.8	27.3	100%

### **QA/QC of automatic monitoring**

Automatic monitoring has been undertaken by St Albans District Council at Fleetville Community Centre on the A1057/Hatfield Road in the East of the City of St Albans. Data ratification and bi-weekly manual calibration is carried out by the Environmental Research Group at Kings College London (ERG) to the AURN standard. Their ratification procedure involves daily sensibility checks, monthly ratification with regard to site visits, and annual review and linear scaling based on NPL's Non-affiliate network sites audit report. To ensure consistency of the QA/QC procedure applied to all sites, ERG have developed an internal 'ratification procedures manual'. Site audits are conducted by NPL on a twice-yearly basis, in conjunction with servicing and maintenance contracted to Casella ETI. PM<sub>10</sub> data is collected by TEOM, and VCM corrected prior to publishing.

### **QA/QC of diffusion tube monitoring**

St Albans City and District Council carry out monitoring of nitrogen dioxide by 39 diffusion tubes at 37 locations. The tubes used are analysed using the 20% TEA in water method by Gradko Ltd following the procedures set out in the Harmonisation Practical Guidance. Results from the WASP scheme indicate that Gradko Laboratories demonstrated good performance in 2008.