



ENVIRONMENTAL SERVICES DIVISION

AIR QUALITY IN THE BABERGH DISTRICT

2006 ANNUAL PROGRESS REPORT

MAY 2007

EXECUTIVE SUMMARY

Local authorities have statutory duties for local air quality management under the Environment Act 1995. They are required to carry out 3-yearly "Updating & Screening Assessments" of air quality across their districts against objectives in the national Air Quality Strategy. Authorities are also required to produce annual "Progress Reports" in between the 3-yearly assessments in order to report progress on implementing local air quality management.

The Council's last Updating & Screening Assessment, published in April 2006 concluded that the Air Quality Objectives for which it has responsibility, were likely to be achieved in the Babergh district.

This report is the Council's third annual Progress Report. The overall aims of Progress Reports are to report the Council's progress on implementing local air quality management in the district and report progress in achieving, or in many cases maintaining, concentrations below the Air Quality Objectives.

For further information or enquiries regarding this report please contact:

Babergh District Council
Natural & Built Environment Division
Corks Lane
Hadleigh
Suffolk
IP7 6SJ

Telephone: 01473 825890

Email: air.quality@babergh.gov.uk

CONTENTS

	Page
1. Introduction	3
1.1 Local Air Quality Management & Progress Reports	3
2. New Monitoring Results	4
2.1 Nitrogen Dioxide Monitoring	4
2.1.1 Continuous NO _x Monitoring Station	5
2.1.2 Diffusion Tube Monitoring Programme	6
2.1.3 Assessment of Monitoring Results	7
3. New Local Developments	8
3.1.1 New Developments with an Impact on Air Quality	8
3.1.2 New Landfill Sites, Quarries etc.	8
3.1.3 New Regulated Industrial Processes	9
4. Planning Applications	9
5. Air Quality Planning Policies	11
6. Implementation of Local Transport Plans	12
REFERENCES	13
APPENDICES	
I National Air Quality Objectives	
II Details of Nitrogen Dioxide Monitoring Locations in the Babergh District	
III Results of Nitrogen Dioxide Diffusion Tube Monitoring by Babergh District Council, January 2006 – December 2006	
IV Continuous Air Quality Monitoring Station, Calibration and QA/QC	
V Babergh District Council Diffusion Tube Monitoring Programme, QA/QC Summary and Calculation of Laboratory Bias	

1. INTRODUCTION

1.1 Local Air Quality Management & Progress Reports

Local authorities have statutory duties for local air quality management under the Environment Act 1995. They are required to carry out 3-yearly Updating & Screening Assessments of air quality across their districts against objectives in the national Air Quality Strategy. The objectives for the seven pollutants prescribed in the national Air Quality Strategy are health based, recommended by a panel of medical and scientific experts. The objectives are listed in Appendix I.

The Council's last Updating & Screening Assessment, published in April 2006 concluded that the Air Quality Objectives for which it has responsibility, were likely to be achieved in the Babergh district.

The Department for Environment, Food and Rural Affairs (DEFRA) also requires that authorities should submit annual air quality Progress Reports in between the 3-yearly Updating & Screening Assessments, in order to provide a means for communicating regular air quality information to the public.

The overall aims of Progress Reports are to:

- Report the Council's progress on implementing local air quality management in the district; and
- Report progress in achieving, or in many cases maintaining, concentrations below the Air Quality Objectives.

The content of Progress Reports is laid down in statutory guidance issued by DEFRA (LAQM.PRG(03), DEFRA, 2003). It is considered that the above aims can best be achieved by addressing two matters:

- New monitoring results; and
- New local developments that might affect local air quality.

The above matters are addressed in this Progress Report. The following optional items have also been included in the Progress Report:

- An assessment of the monitoring data in relation to likely exceedances of the objectives;
- New developments that may affect local air quality;
- Planning applications that have the potential to affect local air quality;
- Relevant updates on planning policies that relate specifically to air quality;

- An update on implementation of the County Council's Local Transport Plan.

2. New Monitoring Results

The Council's last Updating & Screening Assessment indicated that, at certain locations in the district, nitrogen dioxide concentrations are close to, but below the Air Quality Objectives – the Council therefore monitors this pollutant at those locations. The assessment concluded that the objectives for the other six pollutants prescribed in the national Air Quality Strategy are likely to be achieved in the Babergh district and so the Council does not routinely monitor these pollutants. However, the Government is considering adopting more stringent EU objectives for benzene and particulates, in which case the Council would have to review its monitoring and assessment programme.

2.1 Nitrogen Dioxide Monitoring

Nitrogen oxides (NO_x), including nitrogen dioxide, are formed from the burning of fossil fuels (oil, coal and their products) e.g. in motor vehicles, power generation and heating. Nitrogen dioxide gas is a respiratory irritant, may exacerbate asthma and possibly increase susceptibility to infections.

The Council routinely monitors nitrogen dioxide concentrations at a number of locations close to busy roads since road traffic is the major nitrogen dioxide producer in the area.

The results from the Council's monitoring programme should be compared against the national Air Quality Objectives for nitrogen dioxide:

- Hourly Mean Objective: 200 µg/m³, not to be exceeded more than 18 times per year, which applied from 31 December 2005.
- Annual Mean Objective: 40 µg/m³, which applied from 31 December 2005.

The first Air Quality Daughter Directive also sets limit values for nitrogen dioxide, which have been transposed into UK legislation. The Directive includes:

- An annual mean limit value of 40 µg/m³ to be achieved by 1 January 2010.
- An 1-hour limit value of 200 µg/m³, not to be exceeded more than 18 times in a year, to be achieved by 1 January 2010.

2.1.1 Continuous NO_x Monitoring Station

The Council has a continuous NO_x monitor alongside the A12 dual carriageway at Lattinford Bridge between Capel St Mary and Stratford St Mary. The location of the monitor is shown in Appendix II. The site was chosen to represent the exposure of the nearest houses to significant traffic pollution and is located 9.0 m from the kerbside i.e. at a similar distance as the closest houses to this section of the A12. There were no significant changes in local circumstances during 2006, such as road works, which may have affected the results. Details of calibration of the monitor and data capture are presented in Appendix IV. The results for 2006 are presented below.

Annual Mean Nitrogen Dioxide

The monthly and annual mean results for 2006 are summarised below. It can be seen that the annual mean objective of 40 µg/m³ was not exceeded in 2006.

Table 1: Continuous Monitor, Summary Statistics for NO₂ Monthly Means, 1 January 2006 to 31 December 2006

Monthly Mean (µg/m ³)	NO ₂ (µg/m ³)
January	27.0
February	31.7
March	27.1
April	25.2
May	25.0
June	23.0
July	22.0
August	21.6
September	23.3
October	22.0
November	22.8
December	23.8
2006 Annual Mean	24.7

Hourly Mean Nitrogen Dioxide

The hourly mean results for 2006 are summarised below. It can be seen that there were no exceedances of the 1-hour mean objective of 200 µg/m³ during 2006.

Table 2: Continuous Monitor, Summary Statistics for 1-Hour Mean NO₂ Concentrations, 1 January 2006 to 31 December 2006

	Maximum NO ₂ µg/m ³	Minimum NO ₂ µg/m ³	Average NO ₂ µg/m ³	Number of exceedances of 1-Hour mean (200 µg/m ³)
January	85.8	4.4	27.0	0
February	75.5	3.8	31.7	0
March	89.8	3.2	27.1	0
April	62.3	3.9	25.2	0
May	84.1	4.3	25.0	0
June	67.2	4.2	23.0	0
July	75.6	4.7	22.0	0
August	60.2	3.0	21.6	0
September	83.1	0.6	23.3	0
October	55.8	3.1	22.0	0
November	71.7	1.0	22.8	0
December	81.1	1.2	23.8	0

2.1.2 Diffusion Tube Monitoring Programme

Babergh District Council has continued its diffusion tube monitoring programme at a number of locations across the district using tubes supplied and analysed by Harwell Scientifics. During 2006 monitoring of nitrogen dioxide was carried out at 7 sites using diffusion tubes exposed for monthly periods. At 6 of the sites the tubes were exposed in duplicate on the facades of houses. Details of the monitoring locations and the results of the survey are presented in full at Appendices II and III. The results are summarised in Table 3. The annual mean results shown have been adjusted for a laboratory bias of 0.78 as determined from co-location study data collected by the University of the West of England (see Appendix V).

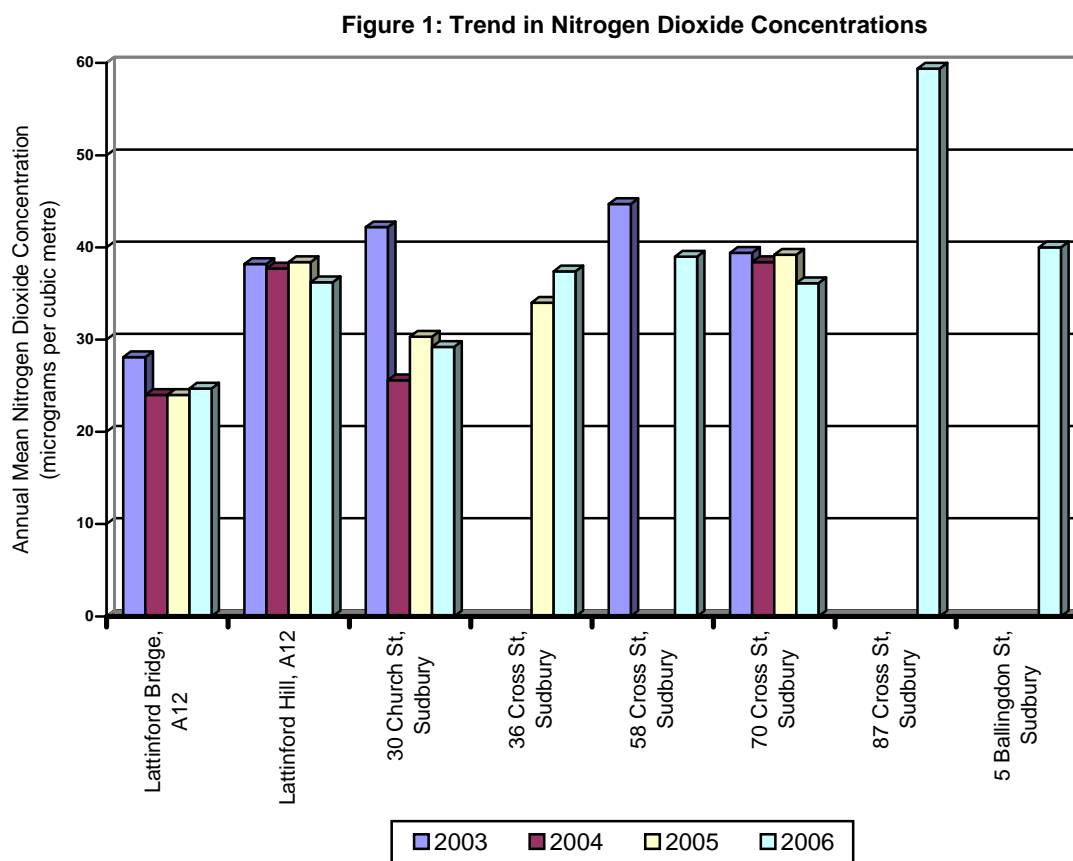
Table 3: Diffusion Tube Monitoring Results, Annual Mean Nitrogen Dioxide, January - December 2006

Location	Site Class*	Annual Mean NO ₂ (µg/m ³)
Lattinford Hill, A12, Stratford St Mary	Roadside	36.2
30 Church Street, Sudbury	Roadside	29.2
36 Cross Street, Sudbury	Roadside	37.4
58 Cross Street, Sudbury	Roadside	39.0
70 Cross Street, Sudbury	Roadside	36.1
87 Cross Street, Sudbury	Roadside	59.4
5 Ballingdon Street, Sudbury	Roadside	40.0

* As defined in DEFRA's Technical Guidance, LAQM.TG(03), (DEFRA, 2003)

Trends in Nitrogen Dioxide Concentrations

The results from monitoring of nitrogen dioxide concentrations since 2003 are presented in Figure 1 below.



2.1.3 Assessment of Monitoring Results

There were no significant changes in local circumstances at the monitoring locations on the A12 during the course of 2006, which could have affected the results. Nitrogen dioxide concentrations at these locations have consistently been below the annual mean Air Quality Objective of $40 \mu\text{g}/\text{m}^3$.

Nitrogen dioxide concentrations on Church Street, Sudbury have also consistently been below the annual mean Air Quality Objective, apart from 2003 when the results were affected by the traffic management system put in place for the reconstruction of Ballingdon Bridge. The traffic flow on Church Street was altered to a one-way system for the first 6 months of 2003 and temporary traffic signalling resulted in vehicles queuing adjacent to the diffusion tube site, with a concurrent increase in nitrogen dioxide concentrations.

It is evident that nitrogen dioxide concentrations vary along Cross Street in Sudbury. The traffic management system in place during the reconstruction of Ballingdon Bridge in 2003 temporarily affected levels at 58 Cross Street and concentrations have since fallen below the annual mean objective. Concentrations at 36 and 70 Cross Street have consistently been below the annual mean objective.

The monitoring programme has been extended to measure concentrations at the northern end of Cross Street (No. 87) and on the south side of Ballingdon Bridge (5 Ballingdon Street). The 2006-annual mean nitrogen dioxide concentrations at these locations were 59.4 $\mu\text{g}/\text{m}^3$ and 40.0 $\mu\text{g}/\text{m}^3$ respectively. These elevated levels obviously give cause for concern. Additional monitoring data is therefore being obtained to determine whether there is a long-term problem, to better understand the reasons for the elevated concentrations at these specific locations and the spatial distribution of nitrogen dioxide levels between Ballingdon Bridge and the northern end of Cross Street. Babergh District Council is working in partnership with the County Council in this regard and five additional diffusion tube sites have subsequently been installed along the section of road to provide widespread coverage. The monitoring data will also enable the impact to be assessed of the road "build-out" at the southern end of Cross Street which was constructed to prevent passing vehicles mounting the kerb and gives priority to southbound traffic. The results of this extended monitoring will be published in the Council's next Progress Report in Spring 2008.

3. New Local Developments

This section deals with changes that may have taken place since the Council completed its last district-wide Updating & Screening Assessment in April 2006. The DEFRA Progress Report Guidance, LAQM.PRG(03), requires local authorities to log any of the following developments, so that they can be considered more thoroughly at the next full Updating & Screening Assessment, due in 2009.

3.1.1 New Developments with an Impact on Air Quality

This section covers developments that have been granted planning permission and could have a significant impact on air quality, including major developments such as new retail or road schemes. Since April 2006, no such permissions have been granted in the Babergh district.

3.1.2 New Landfill Sites, Quarries etc.

This section covers new landfill or quarrying activities which have been granted planning permission since the last Council's Updating & Screening Assessment in April 2006. Suffolk County Council as the Minerals Planning Authority (MPA) is currently consulting on its Minerals Site Specific Allocation Plan, which includes proposals for quarrying at sites in

Layham, Great Waldingfield, Chilton, Leavenheath and East Bergholt. The Allocation Plan is the second stage of consultation on the proposals and will lead to the formulation of the County Council's preferred options, which will be published for consultation in September 2007. If any sites in the Babergh district are allocated by the MPA, they will be considered during Babergh District Council's next Updating & Screening Assessment, due in 2009.

3.1.3 New Regulated Industrial Processes

This section covers new industrial processes regulated for emissions under the Pollution Prevention and Control (England & Wales) Regulations 2000 (PPC). There are two installations which have been operating in the district for some time, but which have only recently required a PPC permit from the Environment Agency. These are:

- Shotley Holdings Limited, Folly Farm, Tattingsstone, Suffolk, IP9 2NY. A PPC permit is required for the continued use of the site for the disposal of waste by landfill.
- Brett Aggregates Ltd, Layham Quarry Landfill Site, Layham, Hadleigh, CO10 0BD. A PPC permit is required for the continued use of the site for the disposal of inert waste by landfill.

DEFRA's Technical Guidance, LAQM.TG(03), identifies such activities as a potential source of emissions of dust particles (PM₁₀). Emissions from these processes are regulated and controlled by the Environment Agency. Both sites were also considered and discounted as significant sources of emissions by Babergh District Council during the last Updating & Screening Assessment in April 2006. The Council will nevertheless endeavour to obtain emissions data in order to quantify any impact on air quality for the next Updating & Screening Assessment, due in 2009.

4. Planning Applications

Progress Reports provide the opportunity to log planning applications for new developments to give a picture of areas where changes may take place and where combined impacts from several developments may become important. The DEFRA Progress Report Guidance requires local authorities to log any major applications under consideration that might affect air quality. The following applications for major developments, with the potential to impact on air quality in Babergh have been submitted since April 2006, or are yet to be determined:

- An application to Babergh District Council for a new supermarket at Brett Works, Hadleigh, which has the potential to impact on road traffic emissions in the locality. An air quality impact assessment has been

submitted in respect of the application. Although this assessment indicates that the proposed development and associated traffic would not cause a significant impact on local air quality, or the Air Quality Objectives to be exceeded, the application is, at the time of writing, held in abeyance and is yet to be determined.

- An application to Babergh District Council for a major mixed-use development at the site of the former British Sugar plc factory, Sproughton Road, Sproughton. The application is for up to 1,100 new homes, up to 3.44 hectares of new serviced employment land, a school, shops, health centre, creche, elderly care home, recreation and sports space, car and cycle parking and landscaping and associated works. The applicant has submitted an Environmental Statement incorporating a detailed assessment of the impact on air quality from increased traffic arising from the development and on the development itself from the surrounding road network. The assessment of the potential impact was based on a “worst case” approach and there is no substantive evidence to suggest that the modelling or assumptions made are anything but robust. The assessment has determined that the concentrations of pollutants would be below their respective Air Quality Objectives in the Babergh district. The application will be determined following a public inquiry by the Planning Inspectorate in June 2007. The outcome will be reported in the next Progress Report in Spring 2008.
- An application has been lodged with Mid Suffolk District Council (MSDC) for a winter sports and entertainment complex (SnOasis), in the parish of Great Blakenham. A public inquiry had been held and the Secretary of State’s decision is anticipated by the end of the year following publication of the Planning Inspector’s report.

This would be a major development, including an indoor ski slope, indoor ice arena, 350-bed hotel, 350 holiday chalets, nine-hole golf course, cinema, nightclub, retail outlets and a “holiday village”. However, whilst it could impact significantly upon the local transport infrastructure, it is anticipated that the vast majority of traffic will arrive via the A14 and A12 carriageways.

The Highways Agency and Suffolk County Council are satisfied that there is sufficient capacity to absorb the anticipated increase in vehicle numbers. A railway station in Great Blakenham also forms part of the overall proposal, and is included as a means of mitigation against increased road traffic. The development cannot proceed without the prior development of the railway station.

As part of the Environmental Statement the applicant provided an air quality assessment carried out by Casella Stanger. The assessment used the approved “Design Manual for Roads and Bridges” (DMRB) model to look at 10 sensitive receptors in the immediate vicinity and the effect of 10

different links on these receptors. The assessment was carried out for the study year (2004) and also, (anticipating the opening year to be 2008) for 2008 and 2023. With regard to nitrogen dioxide, the assessment concluded that the Air Quality Objectives would not be exceeded at any of these locations, with a predicted maximum annual mean of 27.8 $\mu\text{g}/\text{m}^3$. With regard to PM_{10} , the assessment concluded that the Air Quality Objectives would not be exceeded at any of these locations – the maximum annual mean is predicted to be 22.3 $\mu\text{g}/\text{m}^3$, compared to the annual mean Air Quality Objective of 40 $\mu\text{g}/\text{m}^3$.

A more detailed assessment of vehicle numbers has also been provided for three sensitive locations: the B1113 north of Sproughton Village; Bramford Road, Great Blakenham; and the A14 by the B1113 junction. Of these three locations, the only one forecast to suffer a significant daily increase in traffic is Bramford Road, Great Blakenham, which is outside the Babergh district. The percentage increases on a “worst case scenario” in the opening year 2008, peak day (Friday), peak month (February) are as follows: Bramford Road (53%); Sproughton village (6.3%); and A14 (6.0%). These figures are much as expected, as the site access is off Bramford Road, and this will be subject to a significant increase in vehicle numbers. The increase in vehicle numbers on the A14 will not be significant compared to existing numbers, and it is anticipated that few vehicles will access the site via the B1113 in Sproughton.

Existing nitrogen dioxide concentrations along the A14 corridor are well below the Air Quality Objectives. Therefore the only change that MSDC will be undertaking to nitrogen dioxide monitoring will be to re-locate a passive sampler in Bramford Road. It should be noted however, that the air quality assessment within the Environmental Statement considered this location, and concluded that the Air Quality Objectives would not be exceeded.

In light of the findings of the Environmental Statement that the Air Quality Objectives will not be exceeded as a result of the development, it is concluded that no further assessment is necessary at this time. However, if the Planning Inspector’s report presents evidence to the contrary, this conclusion will be reviewed. It is anticipated that the outcome of the inquiry will be reported in the next Progress Report in Spring 2008.

5. Air Quality Planning Policies

The Babergh Local Plan Alteration No. 2 (2006) sets out land use proposals and detailed policies for the control of development up to the year 2016. The policies determine the Council's approach to the relationship between planning and air quality. They are important as new developments proposals are judged against these policies. The plan incorporates a new section on air quality as well as policies and guidance on transport and land-use aimed at improving, or at least maintaining, current standards of air quality. These include:

- The identification of areas in close proximity to the A12 and A14 trunk roads as being unsuitable for further residential development due, in addition to other planning issues, to the potential impact on health, and to avoid further deterioration in localised air quality. The A131 southern approach to Sudbury has also been identified as a potential "hotspot", where the impact of new development should be carefully considered.
- Land-use planning policies aimed at locating new development in the most appropriate sustainable locations, namely Sudbury, Hadleigh and the larger villages, where there are good public transport facilities, local services/facilities and a range of employment opportunities. Planning policies have also been included to retain all of these services/facilities locally, in order to avoid creating the need for new car journeys.
- Transport policies aimed at reducing growth in the number and length of motorised journeys and encouraging alternative, more sustainable, modes of transport.

6. Implementation of Local Transport Plans

For the first time, the Suffolk County Council Local Transport Plan 2006-2011, (LTP) includes a dedicated chapter on air quality. The LTP has been developed in consultation with Babergh District Council to obtain information on current levels of air quality in the district and to identify locations approaching the Air Quality Objectives. The LTP identifies Cross Street in Sudbury as an area of concern, where on-going monitoring of nitrogen dioxide is being carried out in partnership with Babergh District Council. Traffic management measures have been put in place at a sensitive location, the southern end of Cross Street. Monitoring at this location is currently underway to establish "before and after" levels. New developments in the area are also being assessed in detail for any effects on local air quality.

As part of the LTP, Suffolk County Council has undertaken to work closely with the district councils and other agencies to develop transport measures to improve air quality and to review its works programme to ensure that air quality priorities are incorporated in the delivery of the LTP.

REFERENCES

1. Babergh District Council, 2006. Babergh Local Plan Alteration No. 2 Second (2006).
2. Babergh District Council, 2006. Report on the Updating and Screening Assessment of Air Quality in the Babergh District. Babergh District Council.
3. DEFRA, 2003. Part IV of the Environment Act 1995, Local Air Quality Management. Technical Guidance, LAQM.TG(03). DEFRA Publications.
4. DEFRA, 2003. Part IV of the Environment Act 1995, Local Air Quality Management. Progress Report Guidance, LAQM.PRG(03). DEFRA Publications.
5. Department of the Environment, Transport and the Regions, 2000. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland - Working together for Clean Air. The Stationery Office.
6. Environment Act 1995, Chapter 25. HMSO.

APPENDIX I

National Air Quality Objectives

The Government's national Air Quality Strategy was published in January 2000 and sets objectives for eight main air pollutants to protect health. Performance against these objectives will be monitored where people are regularly present and might be exposed to air pollution. Under Local Air Quality Management, local authorities must work towards achieving the objectives prescribed by regulation for seven of the pollutants, but not that for ozone since this is affected by pollutants produced outside the UK.

Objectives for air pollution are concentrations over a given time period that are considered to be acceptable in the light of what is known about the effects of each pollutant on health and on the environment. They can also be used as a benchmark to see if air pollution is getting better or worse. A summary of the objectives is given in the table below.

Objectives included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purpose of Local Air Quality Management			
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	10.0 mg/m ³	Maximum daily 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	Hourly mean	21.12.2005
	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	Hourly 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

* The objectives for nitrogen dioxide are provisional

† Measured using the European gravimetric transfer sampler or equivalent

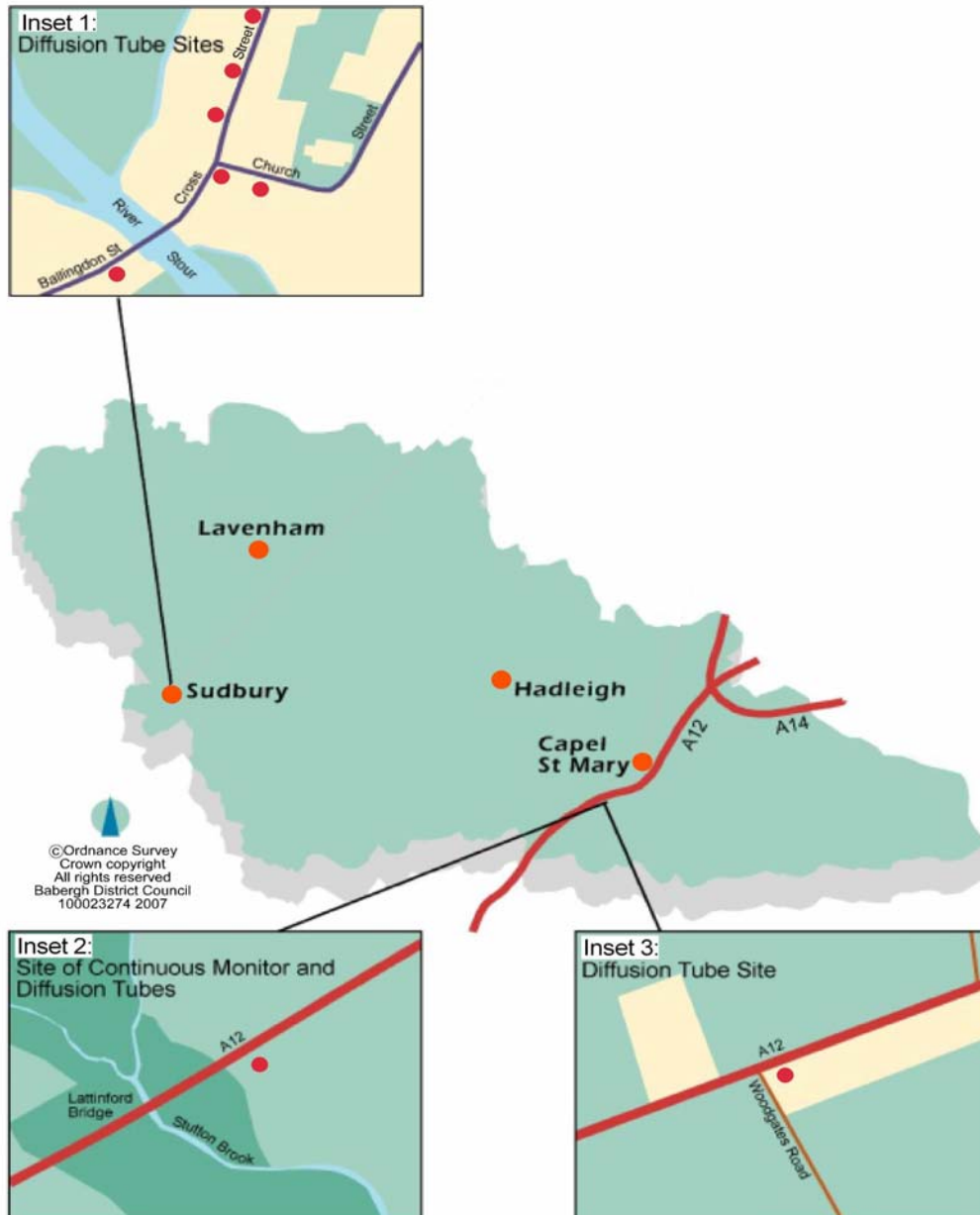
µg/m³ micrograms per cubic metre

mg/m³ milligrams per cubic metre

APPENDIX II

Details of Nitrogen Dioxide Monitoring Locations in the Babergh District

Nitrogen Dioxide Monitoring Locations - Continuous Monitor and Diffusion Tube Sites



Location	Grid Co-ordinates	Monitoring Method	Site Class*	Distance from Kerbside (m)	Site Description	Purpose of Monitoring
Lattinford Bridge, A12, Stratford St Mary	608011 236914	Continuous Monitor and Triplicate Diffusion Tubes	Roadside	9.0	At same distance from road as closest houses	Monitor worst case relevant exposure
Lattinford Hill, A12, Stratford St Mary	607448 236635	Diffusion Tube	Roadside	9.0	At façade of closest houses to road	Monitor worst case relevant exposure
30 Church Street, Sudbury	586822 240945	Diffusion Tube	Roadside	0.9	At façade of closest houses to road	Monitor worst case relevant exposure
36 Cross Street, Sudbury	586790 240944	Diffusion Tube	Roadside	1.5	At façade of closest houses to road	Monitor worst case relevant exposure
58 Cross Street, Sudbury	586798 241010	Diffusion Tube	Roadside	3.3	At façade of closest houses to road	Monitor worst case relevant exposure
70 Cross Street, Sudbury	586817 241068	Diffusion Tube	Roadside	1.4	At façade of closest houses to road	Monitor worst case relevant exposure
87 Cross Street, Sudbury	586842 241148	Diffusion Tube	Roadside	0.9	At façade of closest houses to road	Monitor worst case relevant exposure
5 Ballingdon Street, Sudbury	586721 240879	Diffusion Tube	Roadside	3.6	At façade of closest houses to road	Monitor worst case relevant exposure

* As defined in DEFRA's Technical Guidance, LAQM.TG(03), (DEFRA, 2003)

APPENDIX III

Results of Nitrogen Dioxide Diffusion Tube Monitoring by Babergh District Council, January 2006 – December 2006 ($\mu\text{g}/\text{m}^3$)

Monitoring Location	Grid Reference		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean	Bias Corrected Mean
	X	Y														
Lattinford Hill, A12, Stratford St Mary	607448	236635	50.3	70.1	58.0	57.7	47.6	40.5	40.3	49.6	45.2	43.2	47.7	6.6	46.4	36.2
30 Church Street, Sudbury	586820	240952	36.5	42.3	32.9	36.3	37.7	35.5	41.4	23.4	36.7	40.9	44.1	38.2	37.4	29.2
30 Church Street, Sudbury	586820	240952	41.7	38.6	35.3	38.8	26.7	31.7	32.6	31.2	40.1	42.9	46.8	43.2		
36 Cross Street, Sudbury	586790	240944	59.9	26.7	47.9	42.7	49.3	52.5	47.7	37.0	53.6	56.4	60.9	55.0	47.9	37.4
36 Cross Street, Sudbury	586790	240944	59.3	26.1	45.8	42.2	45.4	48.5	45.1	36.4	49.1	50.2	57.1	54.7		
58 Cross Street, Sudbury	586798	241010	51.3	55.7	49.9	53.9	50.8	46.7	47.1	49.6	48.8	50.8	61.4	55.3	50.0	39.0
58 Cross Street, Sudbury	586798	241010	47.6	54.2	46.5	48.2	50.2	39.1	41.2	46.2	41.7	46.6	60.0	51.0		
70 Cross Street, Sudbury	586817	241068	44.7	51.7	44.3	49.0	47.0	52.7	46.8	45.1	43.1	48.7	48.5	40.2	46.3	36.1
70 Cross Street, Sudbury	586817	241068	50.0	54.4	41.4	48.2	40.4	43.0	38.5	45.2	43.9	48.0	51.2	44.0		
87 Cross Street, Sudbury	586842	241148	75.0	79.5	66.9	83.7	81.9	69.2	71.9	68.8	80.5	82.8	98.3	100.5	76.1	59.4
87 Cross Street, Sudbury	586842	241148	68.4	74.1	61.4	72.0	78.6	61.3	65.2	68.7	68.1	70.2	90.9	86.9		
5 Ballingdon Street, Sudbury	586721	240879	54.8	58.7	56.4	37.3		50.1	49.2	38.2	52.6	63.0	59.8	67.8	51.3	40.0
5 Ballingdon Street, Sudbury	586721	240879	45.5	51.6	55.5	34.1		46.7	48.6	35.1	48.6	53.7	58.4	62.9		

APPENDIX IV

Continuous Air Quality Monitoring Station Calibration and QA/QC

Calibration Summary

The Council's NO_x monitor measures and analyses by ozone chemiluminescence. Data from the analyser is stored on a data logger as "raw" or "uncorrected" data and must therefore be corrected or "validated". To validate the data, automatic daily calibration checks are undertaken by Casella Measurement Ltd, an equipment support unit in the UK Air Quality Monitoring Network. Fortnightly manual calibrations are also carried out by the Council to enable missing calibration data to be checked and adjusted accordingly. These calibrations verify the response of the monitor to "zero" and "span" by introducing a high concentration of nitric oxide gas. The daily calibration check produces an actual zero response and a span response value which are stored in a calibration file on the logger. National Physical Laboratory certified span gases are used.

In rescaling and validating the data from the system both sets of values are used to correct the data to validated figures. Data collection and data ratification is performed by air quality specialists at Casella Measurement Ltd, utilising dedicated software.

QA/QC and Data Capture Summary

Data is stored in the data logger by communication between the logger and the analyser. The data capture summary below outlines the percentage of data included in the data set as validated data. Data capture statistics are for all valid data; data excluded from the statistics are periods when the analyser is in auto-calibration, or during calibration visits by local site operatives, service engineers and QA/QC auditors. However, data loss can also occur when data cannot be stored onto the logger for various reasons, including:

- Power cuts to the monitor
- Analyser faults
- Logger faults

Data may also be excluded in periods where the analyser's calibration response is determined as unstable.

Data capture for 2006 was:

Measured Parameter	Nitrogen Oxides (NO_x)	Nitric Oxide (NO)	Nitrogen Dioxide (NO₂)
January	100%	100%	100%
February	99.7%	99.7%	99.7%
March	100%	100%	100%
April	100%	100%	100%
May	99.9%	99.9%	99.9%
June	100%	100%	100%
July	99.9%	99.9%	99.9%
August	99.9%	99.9%	99.9%
September	46.7%	46.7%	46.7%
October	23.9%	23.9%	23.9%
November	100%	100%	100%
December	100%	100%	100%

DEFRA's Technical Guidance LAQM.TG(03) states that data capture for a chemiluminescence monitor should be >90% during each sample period for the sampling data to be considered valid in any calculations. Due to operational problems with the monitor, data capture during the calendar months of September and October was below DEFRA's recommended level and hence the data for those periods should be considered invalid.

APPENDIX V

Babergh District Council Diffusion Tube Monitoring Programme QA/QC Summary and Calculation of Laboratory Bias

QA/QC Summary

All diffusion tubes were supplied and analysed by Harwell Scientifics Ltd, Didcot, Oxfordshire. The tubes were of the Palmes type, manufactured from polyethylene. The absorbent used was a 50:50 mix of Triethanolamine and acetone. The grids were soaked in the mixture and the excess removed by “dabbing” the grids on sorbent paper before assembly.

When selecting a laboratory for the supply and analysis of diffusion tubes, it is important to ensure they follow the correct Quality Assurance and Quality Control procedures. In this respect, Harwell Scientifics Ltd participate in inter-laboratory round-robin exercises, including the Workplace Analysis Scheme for Proficiency, Aquacheck and the monthly doping solution test organised by AEA Technology, who co-ordinate the UK National NO₂ Diffusion Tube Survey, which is subjected to scrutiny through Quality Assurance procedures and inter-comparison. Harwell Scientifics Ltd is also formally accredited to UKAS standards for the analytical method.

Calculation of Diffusion Tube Bias Based on Co-Location Studies

The simultaneous co-exposure of triplicate diffusion tubes alongside a continuous monitor is essential in order to define bias and precision associated with diffusion tube measurements throughout the period of monitoring. In the event of significant bias in diffusion tube measurement data being identified, appropriate scaling factors may be defined from the co-exposure data and applied to the diffusion tube measurement data to correct for any systematic bias. For this report, a bias adjustment factor was obtained from University of the West of England Review and Assessment website, Spreadsheet Version Number: 03/07: www.uwe.ac.uk/aqm/review. The correction factor and the data used to derive them are reported below.

Local Authority*	Site Type	Length of Study (months)	Diffusion Tube Mean Concentration (Dm) ($\mu\text{g}/\text{m}^3$)	Automatic Monitor Mean Concentration (Cm) ($\mu\text{g}/\text{m}^3$)	Bias %	Bias Adjustment Factor (Cm/Dm)
Watford BC	I	9	39	37	6.9	0.94
Cambridge CC	R	11	47	45	4.1	0.96
Adur DC	R	11	42	34	23.6	0.81
Ashford BC	R	12	44	35	23.4	0.81
Gravesham BC	B	12	34	29	15.8	0.86
Gravesham BC	R	12	57	52	10.5	0.91
Newport CC	O	12	32	22	46.5	0.68
Rugby BC	UB	11	29	19	50.5	0.66
Falkirk Council	R	12	41	30	35.1	0.74
Falkirk Council	R	11	34	18	86.2	0.54
Falkirk Council	UB	12	26	19	37.0	0.73
AEA E & E Intercomparison	K	10	131	108	21.8	0.82
Overall Factor (12 studies)						0.78

*Diffusion tubes analysed by Harwell Scientific Services using 50% TEA in acetone