

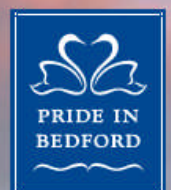


BEDFORD BOROUGH COUNCIL

An Update and Screening Assessment of Air Quality in the Bedford Borough

April 2009

- Technical Services Group
- Environmental Health Service
- Pollution Control Section



YOUR AIR QUALITY



Bedford Borough Council

Introduction

Clean air is essential for a good quality of life and progress has been made since the smogs of the 1950s by regulating industry and introducing smoke control areas. However, there are still problems with certain pollutants, particularly from vehicles. In July 1995, the Environment Act 1995 received Royal assent. Part IV of the Act established a new framework for improving air quality, embracing the National Air Quality Strategy, and incorporating health based standards and systems for the management of air quality.

In keeping with the objectives of the Environment Act and as part of a commitment to sustainable development, Bedford Borough Council approved a Local Air Quality Strategy. A corner stone of this Strategy is the Review and Assessment of Bedford's air quality. The objective is to undertake monitoring and evaluation of air quality throughout the borough in a staged process in order to reduce pollution hot spots and integrate air quality into strategic decision making and policies on a local basis. Review and Assessments of local air quality are required every three years and, if necessary, Air Quality Management Areas (AQMA) declared where pollution levels are found likely to exceed national standards. This continual need to review air quality is because of the consequence of changing circumstances including new and expanding industry and increasing vehicular use which could all potentially impact on local air quality.

Air Quality Review & Assessment (2004-2005)

Two Detailed Assessments carried out as part of the second round of Review and Assessment confirmed that emissions of Nitrogen Dioxide from the traffic within three locations in Bedford (High Street, Prebend Street and the A421 running through the village of Great Barford) were such that the annual mean National Standard for Nitrogen Dioxide was likely to be exceeded by the objective date of 31st December 2005. In addition, it was concluded that the emissions from the Stewartby Brickworks were such that all three National Standards for Sulphur Dioxide were likely to be exceeded by their respective objective dates, the earliest being 31st of December 2004.

In 2005 the Borough Council declared four AQMA's and commenced two Further Assessments with which to inform the two Action Plans that will be needed to bring about the improvements in air quality necessary to ensure the National Standards are met. A Progress Report in 2005 provided further confirmation of the highlighted

exceedances and also identified a need to expand the Nitrogen Dioxide passive air quality monitoring resources, particularly for those sites in London Road and Dame Alice Street. A commitment was also made to install new, more accurate, real time air quality monitoring stations in key locations to monitor both Sulphur Dioxide and Nitrogen Dioxide.

Air Quality Update and Screening Assessment (2006)

As part of its continuing obligations under the Environment Act 1995, Bedford Borough Council commenced the third round of Review and Assessment in 2006 with an Update and Screening Assessment. The purpose being to re-examine the local air quality within the whole Borough to establish if there had been any changes since the second round of Review and Assessment which could threaten air quality elsewhere in the Borough other than those areas where AQMA's had been previously declared. This report incorporated the results of the newly expanded passive air quality monitoring resources for Nitrogen Dioxide. It concluded that, as a consequence of emissions from traffic, there may be a need to expand the existing AQMA's on the High Street and Prebend Street, Bedford. In addition, concerns were raised over the air quality on part of Goldington Road and Ampthill Road Bedford where again, emissions from traffic could threaten achievement of the annual mean National Standard for Nitrogen Dioxide.

Air Quality Further Assessment (2006)

Bedford Borough Council has now completed two Further Assessments in respect of the air quality situation in the previously declared AQMA's. These in depth studies have been conducted to characterise the sources of pollution so as to enable effective targeting within the Action Plans. The Further Assessment for Nitrogen Dioxide has supplemented information the Borough already had on the need to either designate further AQMA's or expand those already existing. The Further Assessment has outlined areas outside of the AQMA's where the National Standards are being exceeded. Following completion of the Detailed Assessments, Bedford Borough Council will identify if an AQMA needs to be declared for the whole town Centre, or if expansion of the existing areas is adequate to encompass the areas where exceedances are identified. The Further Assessment for Sulphur Dioxide has shown that the National Standards are still being exceeded in and around the Stewartby area. The existing AQMA incorporates the area of exceedance which the Action Plan will work towards improving in the future.

Air Quality Action Plan (2007)

The AQAP drawn up by Bedford Borough Council details the measures that the Borough and its partners are taking to help improve the Air Quality of Bedford. The AQAP reflects the results of previously declared AQMA's by introducing schemes and measures to reduce the pollution emitted from vehicles and Stewartby

Brickworks. The AQAP is a working document and will be continually reviewed and updated in order to achieve each new target set. The AQAP details the need of a multidisciplinary approach, involving all partners in order to improve Bedford Air Quality.

Air Quality Detailed Assessment (2007)

Bedford Borough Council has now completed a Detailed Assessment as part of the next step of the Local Air Quality Management process. The Detailed Assessment was also required as a result of the findings of the Council's 2006 Updating and Screening Assessment. The earlier screening assessment identified other parts of the Council which may exceed the government's annual mean. The purpose of this report was therefore to provide an accurate assessment of the likelihood of the objective being exceeded at locations with relevant exposure. The Detailed Assessment has identified that further AQMA's for London Road, Goldington Road and Newnham Avenue need to be declared. The report also identified the need to continue monitoring on Ampthill Road.

Progress Report (2008)

The Air Quality Progress Report fulfils this part of the Council's commitment to the continuing Local Air Quality Management process. The report provides an annual update of recent air quality issues in Bedford as well as a focus on the Council's progress on reducing air pollution through its Air Quality Action Plan. The more up to date monitoring of nitrogen dioxide confirms that the Government's air quality objectives are still being exceeded widely at locations near the Bedford town centre with relevant public exposure. The Council will therefore maintain its AQMA's for this pollutant. As reported by the Council previously, the Stewartby Brickworks is the main source of emissions leading to the AQMA declaration, the Brickworks closed at the end of February 2008. We will continue to monitor until the end of December 2008 then produce an AQMA Revocation Order to formally revoke the AQMA, as discussed with Defra's consultants.

Updating and Screening Assessment (2009)

The Updating and Screening Assessment fulfils the Council's requirements under the Environment Act 1995 and commences the 4th round of review and assessment process. The report re-examines pollution sources in the Borough to identify any relevant areas where it is considered that the Government's Air Quality objectives for the eight pollutants will be exceeded. The report identified that for the pollutants: carbon monoxide, benzene, 1,3-butadiene, lead, sulphur dioxide and particulates PM10 there is not a significant risk of the objectives being exceeded in the Borough. For Nitrogen Dioxide the Council has recently designating a town centre AQMA 5, the finding from the report confirm that the annual mean nitrogen dioxide objective is widely exceeded within the new AQMA. The Council will therefore continue to monitor within the AQMA. The report also provides data to enable the Council to

revoke AQMA1 Sulphur Dioxide (Stewartby) and AQMA 4 Nitrogen Dioxide (Great Barford).

Moving Forward - Improving Local Air Quality

A Town Centre AQMA 5 is in the process of being declared which will encompass AQMA 2 and 3 and other areas of exceedences that have been identified from the Detailed Assessment 2007 and from this report. A further Assessment will be completed involving Urban Wide Modeling so that an Action Plan can be drawn up to ensure effective targeting across the whole of the town centre rather than concentrating on individual roads.

With the closure of Stewartby brickworks this assessment reports on the results since the closure to revoke AQMA1. The report also provides information to revoke AQMA 4 in Great Barford where the new bypass has directed traffic away from the village. One real time monitoring station has been installed on Prebend Street for Nitrogen Dioxide and another is due to be installed in Lurke Street to measure the Air Quality from the High Street.

Our Commitment to You

Bedford Borough Council's Corporate Plan identifies 6 key priorities to which the Council is fully committed, one of these is to provide a "Clean and Green Borough". As part of this commitment the Council strives for a continuing improvement of air quality within the Borough making it a safe and clean place to live, work, visit and enjoy. With this in mind the Council will use its best endeavours to secure the achievement of the National Standards.

David Logan

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Fourth Round Updating and Screening Assessment
for
Bedford Borough Council

April 2009

Acknowledgements

The assistance of Melanie Crump and Barry Williams from the Bedford Borough Council is gratefully acknowledged in the production of this report.

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1 Executive Summary

The Council are required to review and assess air quality against the objectives in the Air Quality Regulations 2000 and the amendment regulations as part of a rolling three-year cycle ending in 2017. The air quality objectives to be assessed are for the following seven pollutants: carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide and particles (PM₁₀).

The role of the local authority Review and Assessment process is to identify any relevant areas where it is considered that the government's air quality objectives for the above air pollutants will be exceeded. Bedford Borough Council has previously undertaken the earlier rounds of Review and Assessment of local air quality management and designated parts of its area as Air Quality Management Areas where these objectives are exceeded and where there is relevant public exposure.

This report concerns the fourth round of Review and Assessment and is the 2009 Updating and Screening Assessment of air quality in the Bedford Borough area. It has re-examined pollution sources in its area in accordance with Defra LAQM guidance (released February 2009).

This report also provides information to enable the Council to revoke AQMA 1 for Sulphur Dioxide and AQMA 4 for Nitrogen Dioxide.

The report identifies that:

For carbon monoxide, benzene, 1,3-butadiene, lead, sulphur dioxide and particles PM₁₀ there is not a significant risk of the objectives being exceeded in the Council's area. For nitrogen dioxide however the Council has recently designated an amended AQMA (called AQMA 5) in the centre of Bedford. The findings from this report confirm that the annual mean nitrogen dioxide objective is widely exceeded in this AQMA.

The Council will therefore undertake the following actions:

1. Undertake consultation on the findings arising from this report with the statutory and other consultees as required.
2. To maintain existing sites throughout the Borough and expand monitoring within the amended AQMA 5.
3. Continue with the implementation of its Air Quality Action Plan in pursuit of the air quality objectives.
4. Prepare for the submission of its 2010 Progress Report.

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1. Introduction

1.1 Description of the Bedford Borough Council area

Bedford Borough Council was vested as a unitary authority on 1st April 2009. Bedford Borough Council includes the main town of Bedford, plus Kempston and 44 rural parishes. Bedford is a modern town, with an historic past, plus excellent rail links to London and the Midlands. 60% of the Borough's 6,359 hectares are Green Belt. The Borough has a population of approximately 154,900 (mid 2007). The town of Bedford has a population about 80,000, with Kempston about 20,000.

The busy A1 and A6 run through the Borough, with the M1 in easy reach. The main sources of air pollutants are busy and congested roads, with the main access to the Bedford town centre from the south constrained by the river Great Ouse and the three bridges that cross it near the town centre. Previously the brickworks in Stewartby were a major source of air pollution, until brick making at the site ceased in 2008. There are about 50 other minor industrial processes that are regulated by the Council, plus other processes regulated by the Environment Agency (including waste water treatment works).

1.2 Purpose of report

This report is the 2009 Updating and Screening Assessment of air quality for Bedford Borough Council. The purpose of the report is to fulfil the Council's initial obligation under the fourth round of Review and Assessment of air quality. In so doing it will determine whether or not there is a risk that an air quality objective will be exceeded in the Borough and therefore whether or not the Council needs to undertake a Detailed Assessment of air quality.

Part IV of the Environment Act 1995 introduced new responsibilities to both national and local government throughout the UK. These responsibilities included the requirement upon the national government and devolved administrations to develop an Air Quality Strategy (AQS) for England, Wales, Scotland and Northern Ireland. The overall purpose of the AQS is to seek improvements in air quality for the benefit of public health. The most recent AQS was produced in 2007 (Defra, 2007).

Local air quality management (LAQM) was also introduced by the Environment Act 1995. Under this local authorities are required to periodically review and assess air quality across their areas. The AQS confirms that LAQM provides a major component of the government's plan for air quality improvement across the UK.

Air quality objectives have been set for those air pollutants deemed to be of most concern and relevance by the AQS. Seven of these pollutants are included under the LAQM regime and regulations for these were introduced. Additional objectives have been set for ozone, polyaromatic hydrocarbons (PAHs) and PM_{2.5}, although these have been deemed the responsibility of national government.

The objectives are all based on health-based standards using current scientific advice taking into account the likely cost and benefits, as well as feasibility and practicality in meeting the objectives. The objectives are mostly in line with limit values prescribed by EU Directive, although additional objectives (including bringing forward the date for compliance) were included for some pollutants.

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

Table 1 Air quality objectives (from Air Quality Regulations 2000 and Amendment Regulations 2002) applicable to the Bedford B.C area

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Maximum daily running 8-hour mean	31.12.2003
Lead	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
Nitrogen dioxide (NO₂)	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
Particles (gravimetric)	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
Sulphur dioxide (SO₂)	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

(Note – the provisional PM₁₀ objectives outlined on the third round USA report were not adopted in England as part of the revised 2007 AQS).

1.4 Summary of previous R&A in Bedford B.C

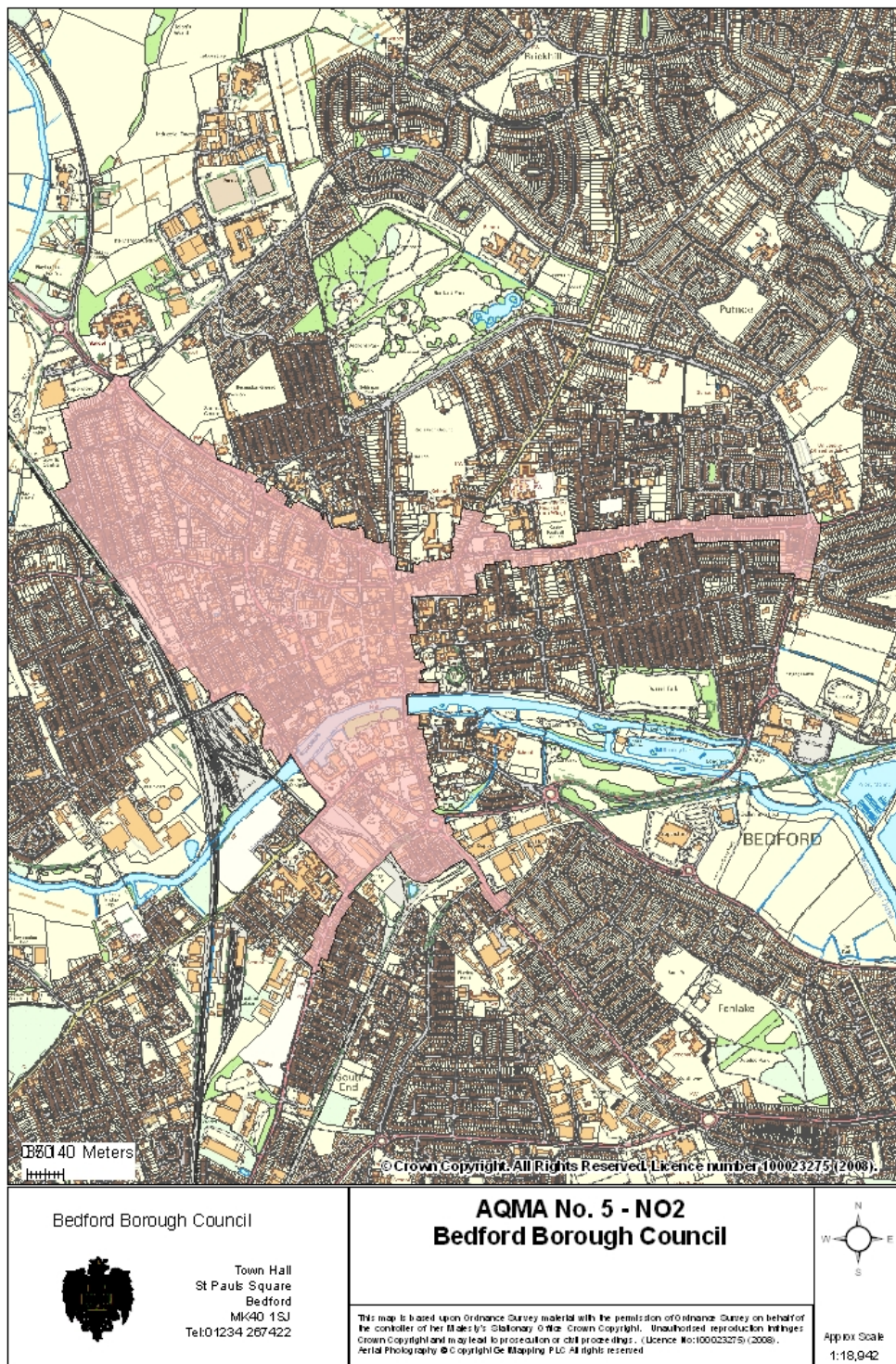
The Council undertook previous rounds of Review and Assessment of air quality. The main issue with respect to local air quality was found to be road traffic emissions (NO₂ and PM₁₀) emanating from vehicles and sulphur dioxide from an industrial process. As a result the Council designated Air Quality Management Areas in parts of the Bedford town Centre, in Great Barford and near Stewartby. The AQMA in Great Barford will be revoked following the opening of the A428 that bypasses Great Barford. The industrial process at Stewartby has also closed and the Council intends to revoke this AQMA upon confirmation that the IPCC permit has been revoked. More recently the Council has revised its Bedford town centre AQMA (called AQMA 5 see

Figure 1).

The 2007 Progress Report (Bedford, 2008) based on updated monitoring confirmed that parts of the Borough are exceeding the air quality objectives for NO₂ and benzene.

The Council's most recent 2007 Detailed Assessment was of nitrogen dioxide at Goldington Road, Newnham Avenue and London Road (all close to the Bedford town centre). The findings of the report confirmed that relevant exposure arose close to those areas where monitored concentrations exceeded the annual mean objective. As a consequence the Council undertook full consultation prior to designating the area shown below as AQMA 5. (Note the previous town centre AQMAs 2 and 3 were incorporated within AQMA 5).

Figure 1 AQMA 5 encompassing the town centre of Bedford



1.5 Fourth Round Review and Assessment

This report concerns the fourth round of LAQM review and assessment (R&A), which is part of a three yearly cycle for review and assessment ending in 2017. It follows the new prescribed guidance given in Technical Guidance LAQM. TG (09) (Defra, 2009a), supported where necessary by new LAQM Tools. The guidance is

designed to help local authorities undertake their duties under the Environment Act 1995 to review and assess air quality in their area from time to time.

It is recognised that most of the original TG03 guidance is still relevant, although some parts required revision to reflect the most up-to-date understanding, and to draw upon experience gained during the third round of Review and Assessment.

Updated guidance has been prepared to cover the following issues:

- Background pollution concentrations and future year adjustments

- New emission tools

- Monitoring of PM₁₀ and use the volatile correction model

- Emissions from narrow roads, railways, poultry farms, biomass combustion

- Data ratification procedures

- NO_x: NO₂ relationships

In addition, the Updating and Screening Assessment (USA) checklists provided in TG09 have been revised and re-issued to take account of all necessary changes.

The guidance requires a phased approach, as with the previous guidance and is undertaken source by source rather than using pollutant specific assessment. This however still requires local authorities to undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded. It is considered that not every authority will need to proceed beyond the first step of the fourth round of review and assessment.

The findings from the USA determine the need for the Council to undertake the next step i.e. a Detailed Assessment and then potentially progressing to the declaration of an air quality management area (AQMA) with a need for an air quality action plan (AQAP).

1.6 Updating Screening and Assessment – important considerations

As with the previous USA's, relevant considerations and sources of data include the following:

Monitoring Data

The Council's monitoring of air quality in its area provides an important source of information for understanding air quality in its area. This benefit can be further enhanced if the monitoring is undertaken as part of a wider e.g. national or regional network. It is however important to ensure that there is confidence in the data being produced and used. Hence QA/QC issues are considered and the data produced also need to be properly validated and preferably ratified.

Background Pollutant Concentrations

These are produced nationally for all local authorities in the UK and provide the estimated background annual mean air pollutant concentrations at a 1 km x 1 km grid resolution. For NO_x, NO₂, PM₁₀ and PM_{2.5} for the 2006 base year with projections for all years to 2020. The data are available from <http://www.airquality.co.uk/archive/laqm/tools.php>

Industrial Sources

Both the Environment Agency and the Council regulate industrial sources under the Pollution Prevention and Control Act 1999 and Environmental Protection Act 1990. The Environment Agency is responsible for the largest industrial processes (Part A processes), whilst the Council is mainly responsible for smaller Part B and A2 processes. Those small industrial processes that fall outside of Part B/A2 Process control can also be of interest to LAQM. Details of the processes and installations are available from the Council's Public Register (see tables in the Appendix). Since the previous USA, five Part B operations (non ferrous metals, concrete batching, other mineral industry and two vehicle re-sprayers) have closed, with two small waste oil burners and one other chemicals installation opening. In addition, permits for dry cleaners have issued. None of these changes however are considered to be important for the purposes of this USA.

In addition a Part A process in the village of Stewartby the manufacture of bricks ceased in early 2008. Confirmation that the permit has been revoked or surrendered is awaited. Other new industrial processes have been included under the PPC regime but these are also not considered to be important for the purposes of this USA.

Road Traffic

Updated details of road traffic movements across the Borough have been made available from the Department for Transport and the Council itself to check for significant changes from the previous USA.

Relevant exposure

The objectives relate to public exposure to the pollutants. More specifically these are any areas that may exceed the government's air quality objectives and relate to "locations which are situated outside of buildings or other manmade structures above or below ground, and where members of the public are regularly present" (from the Air Quality regulations). TG09 advises further that the assessment should focus on

those locations where members of the public are likely to be regularly present and are likely to be exposed over the period of the objective.

2. New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic monitoring

The Council recently opened a new continuous site in Prebend Street, near the centre of Bedford, monitoring oxides of nitrogen (including nitrogen dioxide). The site is within the newly revised town centre AQMA 5 (it was also in the previous AQMA 2). The site is at the roadside and is within 5m of the kerb. It also represents relevant exposure (see Figure 2). The site was opened in December 2008 and is part of the Herts and Beds Air Pollution Monitoring Network. Data from the site have traceability to national standards and operational procedures defined for the regional Network, which are similar to those of the government's AURN sites, with validation and ratification undertaken by ERG at King's College London.

Figure 2 Prebend Street monitoring site in Bedford



1.1.1

The Council also undertook continuous monitoring at two other fixed long-term sites:

- Stewartby (BF1) – a rural site located close to the local primary school and the brickworks in the village of Stewartby (this monitoring site started operating in 2000 and closed in February 2009). The site was operated to AURN standards as part of the government's network. Sulphur dioxide and ozone were monitored at the site.
- Kempston (BF2) - a site located downwind of the brickworks in Stewartby (this site started operating in late 2006) and monitors sulphur dioxide. The site is also part of the Herts and Beds Air Pollution Monitoring Network.

1.1.2 Non automatic monitoring

The Council undertakes monitoring of air quality using non-continuous methods of measurement and has not undertaken a co-location study. The diffusion tubes are exposed at 63 locations (using 65 diffusion tubes for each monitoring sample). The sites include roadside and background sites within the urban centre of Bedford and also sites outside this area, including some villages. These include sites within the Council's new AQMA, as well outside of the AQMA. Twenty monitoring sites were started in 2004 and a further three were added in 2006. The three further sites were located close to the town centre. A further 19 sites were added in the newly revised AQMA 5. Most of the sites added since 2004 are located close to the façade of existing properties representing relevant exposure. The details of the nitrogen dioxide (NO₂) monitoring sites are provided in Table 2.

Table 2 Details of NO₂ diffusion tube sites

Site number	Location	Site type	Relevant exposure Y/N	Distance to nearest road (N/A if not applicable)	Worst case location Y/N
1	20 High Street, Bedford	UK NO2 NETWORK 1 R	Y	< 5m	Y
2	135 George St, Bedford	B	Y	N/A	N
3	Arrowleys, Bedford	UK NO2 NETWORK 3 B	Y	N/A	N
4	61 The Links, Kempston	UK NO2 NETWORK 2B	Y	N/A	N
5	Bromham Road, Bedford	R	Y	< 5m	Y
6	Goldington Road, Bedford	R	Y	< 5m	Y
7	Bunyan Road, Kempston	R	Y	< 5m	Y
8	Churchville Road, Bedford	B	Y	N/A	N
9	Riverfield Drive, Bedford	B	Y	N/A	N
10	Kirkstall Close	B	Y	N/A	N
11	Great Barford	B	Y	N/A	N
12	The Lane, Wyboston	B	Y	N/A	N
13	Gt Nth Road, Wyboston (A1) South	B	Y	N/A	N
14	River Street	R	Y	< 5m	Y
15	Woburn Road, Kempston	B	Y	N/A	N
16	Kempston Road, Bedford	R	Y	< 5m	Y
17	Amphill Road, Bedford	R	N	< 5m	Y
18	Castle Road, Bedford	B	Y	N/A	N
19	Kimbolton Road, Bedford	R	Y	< 5m	Y
20	Prebend Street, Bedford	R	Y	< 5m	Y
21	Gt Nth Road, Wyboston (A1) North	R	N	< 5m	Y
22	Gt Nth Road, Wyboston (A1) North	R	N	< 5m	Y
23	Gt Nth Road, Wyboston (A1) North	R	N	< 5m	Y
24	Great Barford no. 10	R	Y	< 5m	Y
25	London Road crossroad	R	Y	< 5m	Y
26	Great Barford opp restaurant	R	Y	< 5m	Y
27	High St (Ladbroke's)	R	Y	< 5m	Y

28	Prebend St (corner of Commercial Road)	R	Y	< 5m	Y
29	Goldington Road (opposite University)	R	Y	< 5m	Y
30	High St (Collins Jewellers)	R	Y	< 5m	Y
31	High St (Luddingtons)	R	Y	< 5m	Y
32	Prebend St (opposite no. 8)	R	Y	< 5m	Y
33	Shakespeare Road, Bedford	R	N	< 5m	Y
34	High St (Kings Arms PH)	R	Y	< 5m	Y
35	Prebend St (new residential)	R	Y	< 5m	Y
36	Ashburnham Road, Bedford	R	Y	< 5m	Y
37	Amphill Road, Bedford	R	N	< 5m	Y
38	Prebend St (opposite no. 35)	R	Y	< 5m	Y
39	Great Barford no. 37	R	Y	< 5m	Y
40	Tavistock Street	R	Y	< 5m	Y
41	Great Barford 6-10 Roxton road	R	Y	< 5m	Y
42	High Street (opposite old BT building)	R	Y	< 5m	Y
43	Dame Alice Street	R	Y	< 5m	Y
44	Midland Road (outside No. 137/139A)	R	Y	< 5m	Y
45	End of Prebend St (opposite roundabout)	R	Y	< 5m	Y
46	Midland Rd (outside Beegees opp Priory St)	R	Y	< 5m	Y
47	On corner Harpur St – opp 51A	R	Y	< 5m	Y
48	Outside Sound & Vision – Tavistock St	R	Y	< 5m	Y
49	Outside John Bull & Co – St Peters St	R	Y	< 5m	Y
50	Outside Seven Oak – St Peters St	R	Y	< 5m	Y
51	Outside Porters Black – Dame Alice St	R	Y	< 5m	Y
52	Outside 13/15 Dame Alice St	R	Y	< 5m	Y
53	Outside Longstaff Gentle & Co – Harpur St	R	Y	< 5m	Y
54	Outside 63 – Union St	R	Y	< 5m	Y
55	Opp urban & Rural on corner – Bromham Rd	R	Y	< 5m	Y
56	Outside flats A6/Kettering Sign – Bromham Rd	R	Y	< 5m	Y
57	Outside 110 Newnham Av	R	Y	< 5m	Y
58	Road sign outside 96 Newnham Av	R	Y	< 5m	Y
59	Warning Triangle outside 117 Newnham Av	R	Y	< 5m	Y
60	Outside Post Office Newnham Av	R	Y	< 5m	Y
61	Outside 185 Goldington Rd	R	Y	< 5m	Y
62	Outside 139 Goldington Rd	R	Y	< 5m	Y
63	Outside BP Newnham	R	Y	< 5m	Y
64	Outside no. 15 London Rd	R	Y	< 5m	Y
65	Outside no. 43 London Rd	R	Y	< 5m	Y

The diffusion tubes used were analysed by Gradko International using a preparation method of 50% TEA in acetone. In the most recent round of Annual Performance Criteria for NO₂ Diffusion Tubes used in LAQM (Defra, 2009b), the laboratory demonstrated good performance in a QA/QC scheme for analysis of NO₂ diffusion tubes. Gradko International participates in the Workplace Analysis Scheme for Proficiency (WASP), which is an independent analytical performance testing scheme. The scheme is an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). The Health and Safety Laboratory (HSL) operate the WASP scheme independently and the cost of operation is borne by the laboratories, which pay an annual fee to HSL.

The 2008 unbiased results of the diffusion tube monitoring in the Borough are given in the Appendix (see

Table 12).

Monitoring using diffusion tubes has advantages over continuous monitoring in that it is far cheaper and therefore more sites can be established and assessed. The main disadvantage is that the method is less precise and accurate than continuous monitoring. The recommended methods to reduce these errors include the use of good QA/QC practices and bias adjustment factors that are derived from co-location studies between continuous analysers and diffusion tubes.

The bias adjustment factors are specific to each year, analysing laboratory, method of analysis and location. The factors are therefore also limited to the data supplied. The Review and Assessment website advises that “in many cases, using an overall correction factor derived from as many co-location studies as possible will provide the ‘best estimate’ of the ‘true’ annual mean concentration, it is important to recognise that there will still be uncertainty associated with this bias adjusted annual mean. One analysis has shown that the uncertainty for tubes bias adjusted in this way is $\pm 20\%$ (at 95% confidence level). This compares with a typical value of $\pm 10\%$ for chemiluminescence monitors subject to appropriate QA/QC procedures.”

The bias adjustment factor for each year reported has been obtained from the default bias adjustment factors (based on the March 2009 spreadsheet derived from the government’s Review and Assessment website). The default factors are based on statistical analyses of reported data provided by other local authorities. The factors used for all years, up to 2006, indicate that the monitored results under estimate concentrations.

For 2007, 15 studies were available and the 2007 factor reported is the most recently available factor (0.98). This factor differed from the factor used for the Council’s 2008 report (0.93), which was the factor available when that report was prepared (the earlier factor was based on 6 studies).

It is worth noting that the 2008 factor has been based on 14 studies at this stage and that the number of studies may increase later in the year. This may well lead to a change in the factor. From the default spreadsheet, the precision for the 2008 studies indicates good performance. The term “precision” indicates how well the diffusion tubes produce similar results from the duplicate and triplicate studies undertaken. The criterion is somewhat arbitrary and it reflects both the laboratory’s performance in preparing and analysing the tubes, plus the handling of the tubes in the field.

Year	Bias adjustment factor
2003	1.11
2004	1.10
2005	1.10
2006	1.01
2007	0.98 (0.93)
2008	0.93

The results of a nation-wide survey of nitrogen dioxide diffusion tube co-location studies were further used to improve current understanding of diffusion tube bias (AQC, 2006). The data suggested that tubes close to a road were more likely to underestimate concentrations, once they have been adjusted for laboratory bias, and conversely tubes further away from roads were more likely to overestimate concentrations.

Further analysis of the results suggested that it was not the distance from roads that mattered; rather it was the different concentrations of nitric oxide, nitrogen dioxide and ozone in the atmosphere. The different concentrations influenced the chemistry taking place within the diffusion tube, in particular the formation of additional nitrogen dioxide from a reaction of ozone with nitric oxide.

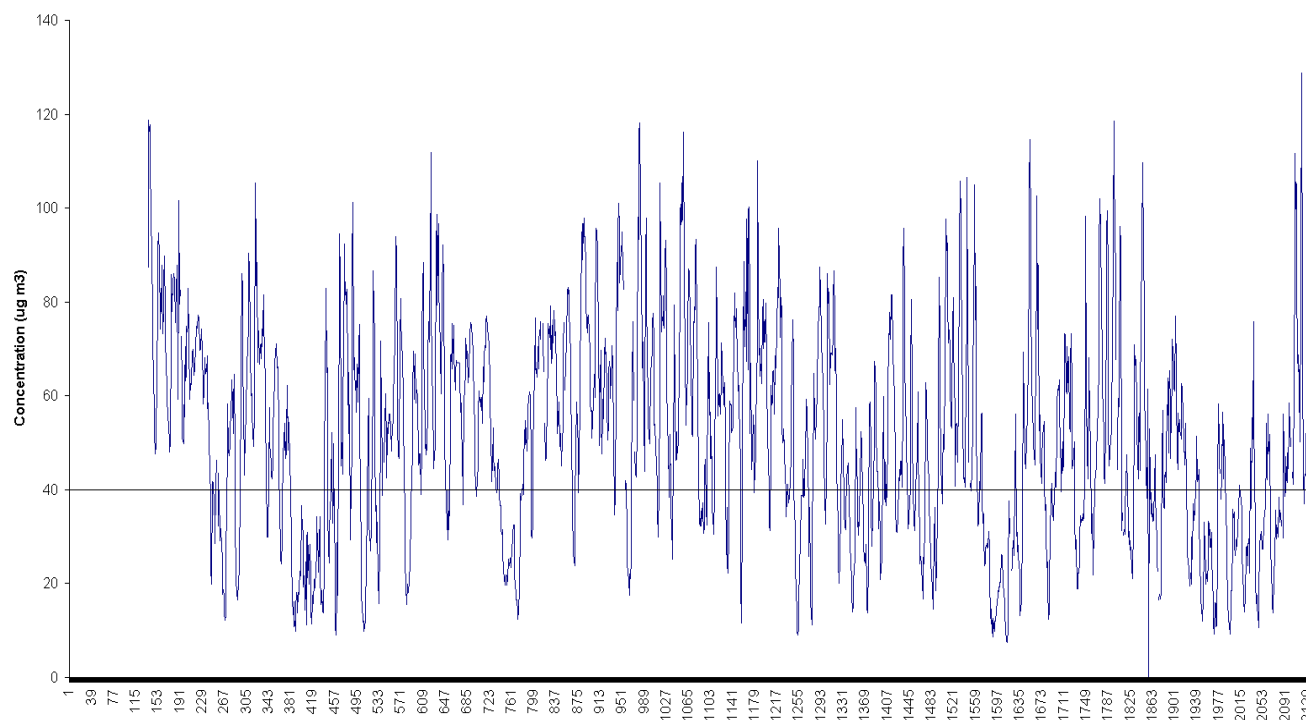
A relationship was identified between diffusion tube bias and the measured annual mean nitrogen dioxide concentration that can be used to further adjust the diffusion tube result. The effect of this 'tube-chemistry' adjustment depends on the measured concentration: thus a laboratory bias adjusted result of $20.0 \mu\text{g m}^{-3}$ would become $18.1 \mu\text{g m}^{-3}$ after adjustment for bias due to tube chemistry. A value of $40.0 \mu\text{g m}^{-3}$ would remain at $40.0 \mu\text{g m}^{-3}$ and $60.0 \mu\text{g m}^{-3}$ would become $65.1 \mu\text{g m}^{-3}$. As shown the effect of this adjustment is minimal at concentrations close to the objective of $40.0 \mu\text{g m}^{-3}$ and so it will not have a material effect on exceedences of the objective identified using diffusion tubes. Although adjusting for tube chemistry can reduce the uncertainty of diffusion tube results, it was not however recommended that this adjustment be applied routinely for the reporting of results.

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

The Council opened its continuous site in Bedford in December 2008. The provisional results for the site to date are shown in Figure 3. The mean concentration for this period since opening is $51 \mu\text{g m}^{-3}$ indicating that the site exceeds the annual mean objective.

Figure 3 Prebend Street monitoring 2009 (showing hourly readings from January to end of March)



The Council also monitored NO₂ across its area using passive diffusion tubes. The monitoring was first started in the late 1990's, although the number of monitoring sites has increased to sixty-three sites and the location of some of the sites has changed. Nineteen new sites were added in mid 2008 in Bedford to check the findings of the 2007 Detailed Assessment in the town centre AQMA.

The results for the Borough of Bedford are shown in Table 3, data capture exceeded 75% for all sites other than site 13 (Great North Road, Wyboston), which was slightly less, plus site 40 (Tavistock Street), which had intermittent results throughout the year and had less than 50% data capture. The 19 new sites installed midway through the year also all had 50% or less data capture. The sites with 50% continuous data capture were adjusted to an annual mean (see below) and are shown in Table 4. (Note – the 2007 results are amended from the 2008 Progress report to reflect the changed default bias adjustment factor as discussed earlier).

For 2008, adjusted estimates were adjusted to a full year where there was less than 12 months diffusion tube data. This adjustment was made using a ratio of annual mean to period mean using continuously monitored data derived from three nearby background sites in the Herts and Beds Air Pollution Monitoring Network, namely in Luton, St. Albans and North Herts. All of these sites had greater than 90% data capture for 2008. The details of the adjustments are provided in the Appendix. The adjustment was only made for those sites with more than 50% i.e. more than 6 months data.

The bias adjusted results for the five-year period from 2003 to 2008 inclusive are also shown in Figure 4, figure 5 and figure 6. Figure 4 shows the results for the new AQMA 5, Figure 5 for those sites outside of the AQMA and Figure 6 for those sites in Great Barford in the revoked AQMA.

Table 3 Bias adjusted annual mean NO₂ concentrations (µg m⁻³) for Bedford (2003 – 2008)

Number	Type	2004	2005	2006	2007	2008	AQMA
1	R	44.7	42.6	40.0	40.5	39.9	Y
2	B	25.4	27.9	24.2	23.4	23.9	Y
5	R	35.7	31.1	31.3	27.5	30.1	Y
6	R	34.5	37.6	34.4	32.7	36.4	Y
14	R	36.5	34.6	35.1	31.5	34.3	Y
17	R	41.6	38.2	37.0	34.0	38.6	Y
18	B	32.6	31.6	30.6	28.6	30.6	Y
19	R	34.2	34.0	31.1	27.3	30.3	Y
20	R	50.3	57.3	58.9	54.8	60.9	Y
25	R	50.7	48.9	46.8	40.9	48.5	Y
27	R	54.1	58.0	57.5	53.8	58.7	Y
28	R	42.7	48.0	44.9	40.6	39.2	Y
29	R	41.8	47.8	45.8	46.5	43.8	Y
30	R	60.1	53.2	49.7	45.9	52.3	Y
31	R	51.3	52.3	52.2	46.1	50.0	Y
32	R	49.9	59.7	53.1	55.4	53.1	Y
33	R	50.3	49.0	50.0	45.5	46.4	Y
34	R	49.3	52.7	51.2	47.7	46.4	Y
35	R	48.5	48.3	42.8	42.0	49.0	Y
36	R	36.8	43.5	43.5	43.0	44.4	Y
37	R	39.6	44.5	42.1	38.8	47.0	Y
38	R	53.8	58.7	57.4	53.7	57.4	Y
40	R	33.0	33.2	30.8	27.8		Y
42	R	40.6	43.2	42.6	42.4	49.6	Y
43	R	49.6	49.0	45.9	48.4	46.2	Y
44	R			42.5	<i>40.5</i>	41.8	Y
45	R			50.5	43.2	46.0	Y
46	R			43.5	38.9	42.0	Y
3	B	22.8	19.5	17.7	<i>20.0</i>	17.9	N
4	B	23.3	23.1	21.8	19.5	18.8	N
7	R	31.5	35.0	30.9	27.4	30.0	N
8	B	27.0	29.0	24.3	23.1	24.8	N
9	B	27.9	29.1	27.0	24.4	25.7	N
10	R	30.1	29.0	27.8	24.3	27.3	N
12	B	26.8	27.0	23.8	22.5	24.4	N
13	B	29.5	29.6	24.9	26.3	25.4	N
15	R	30.8	33.1	31.6	26.4	30.2	N
16	R	31.6	32.4	29.1	28.4	31.6	N
21	R	44.4	45.9	43.6	40.7	43.9	N
22	R	44.2	46.1	44.2	41.5	45.9	N
23	R	39.6	47.1	42.7	41.0	43.2	N
11	B	47.9	51.6	42.3	20.1	23.4	Revoked
24	R	49.7	48.5	38.2	22.5	24.2	Revoked
26	R	43.5	47.8	41.5	23.1	25.7	Revoked
39	R	46.3	46.1	38.3	23.6	31.0	Revoked

41	R	30.4	31.6	24.1	<i>19.0</i>	18.1	Revoked
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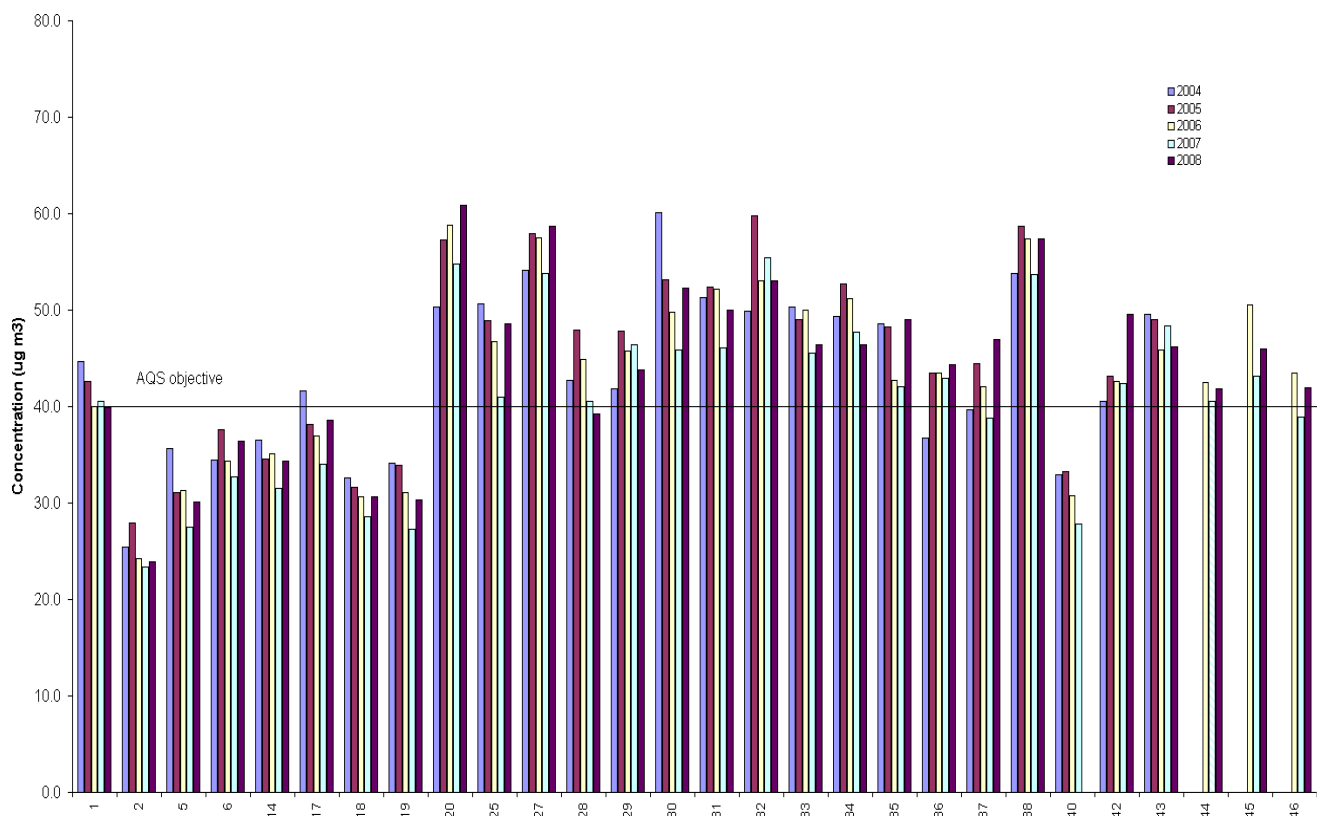
(Notes: R is roadside; B is background; italics represent less than 9 months monitoring)

Table 4 2008 Bias adjusted annual mean NO₂ concentrations (µg m⁻³) for the new Bedford sites

Number	Type	2008	AQMA
47	R	37.0	Y
48	B	53.0	Y
49	R	63.3	Y
51	R	54.3	Y
53	B	46.8	Y
58	R	35.6	Y
60	R	46.9	Y
62	R	37.4	Y
63	R	42.8	Y

(Note – only those sites with 6 months data are included)

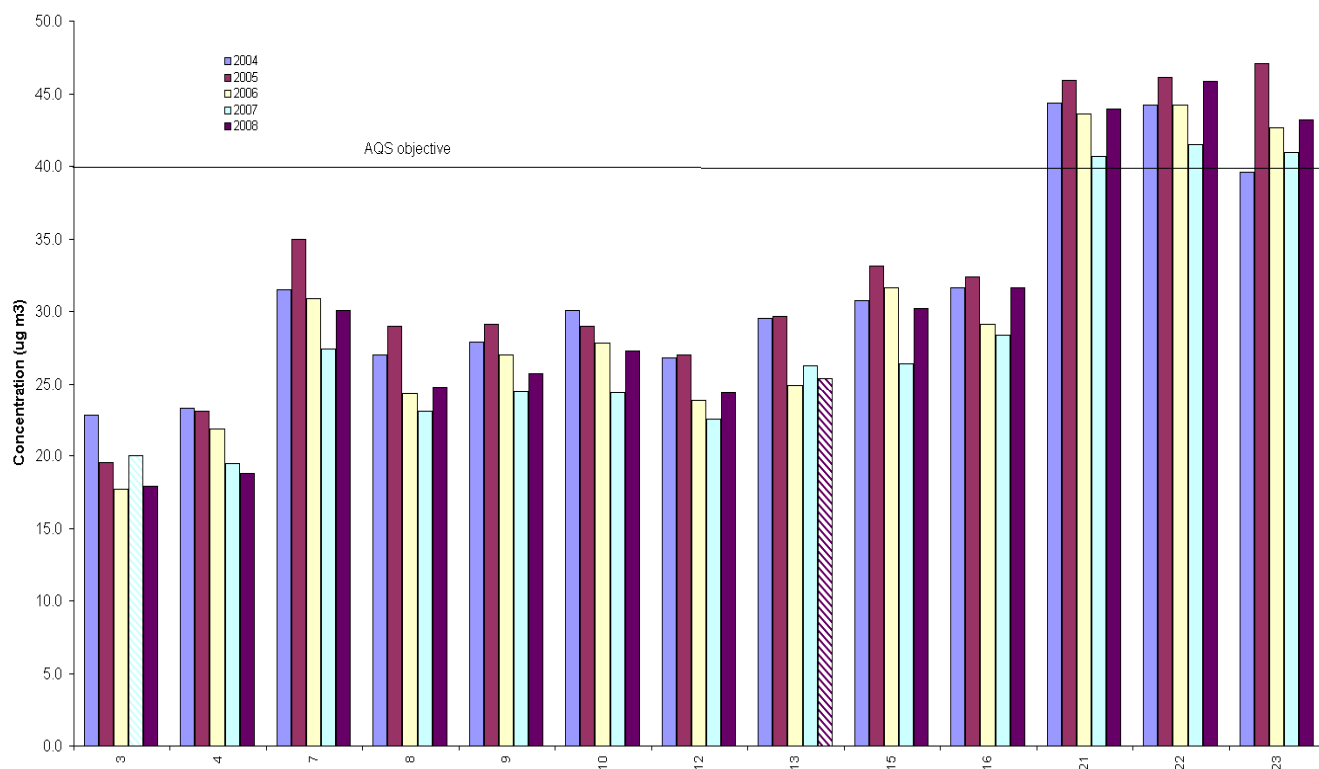
Figure 4 Bias adjusted annual mean NO₂ concentrations (µg m⁻³) in AQMA 5 in Bedford (2003 – 2008) (Note – sites with less than 9 months data capture and that have been adjusted are shown with a downward diagonal pattern)



The bias adjusted annual concentrations for 2008 indicate that the government's air quality objective of $40 \mu\text{g m}^{-3}$ was exceeded at 18 monitoring locations in AQMA 5. The objective was not however exceeded at the two background sites located in the AQMA (sites 2 and 18), plus sites 5, 6, 14, 18, 19 and 40, which have all not previously exceeded the objective. Note both sites 1 and 17 approached the $40 \mu\text{g m}^{-3}$ objective in 2008 and have exceeded it in previous years.

The highest concentrations in 2008 arose in the High Street and Prebend Street and exceeded an annual mean concentration of $50 \mu\text{g m}^{-3}$. The concentrations at 4 of the sites was the maximum recorded during the period shown (2004 – 2008). In all 21 of the sites shown recorded higher concentrations in 2008, than 2007. This may be as the results of inter annual variations, the meteorology in 2007 or other factors. The sites in other streets and towards the edge of the new AQMA recorded lower concentrations, between 40 and $50 \mu\text{g m}^{-3}$.

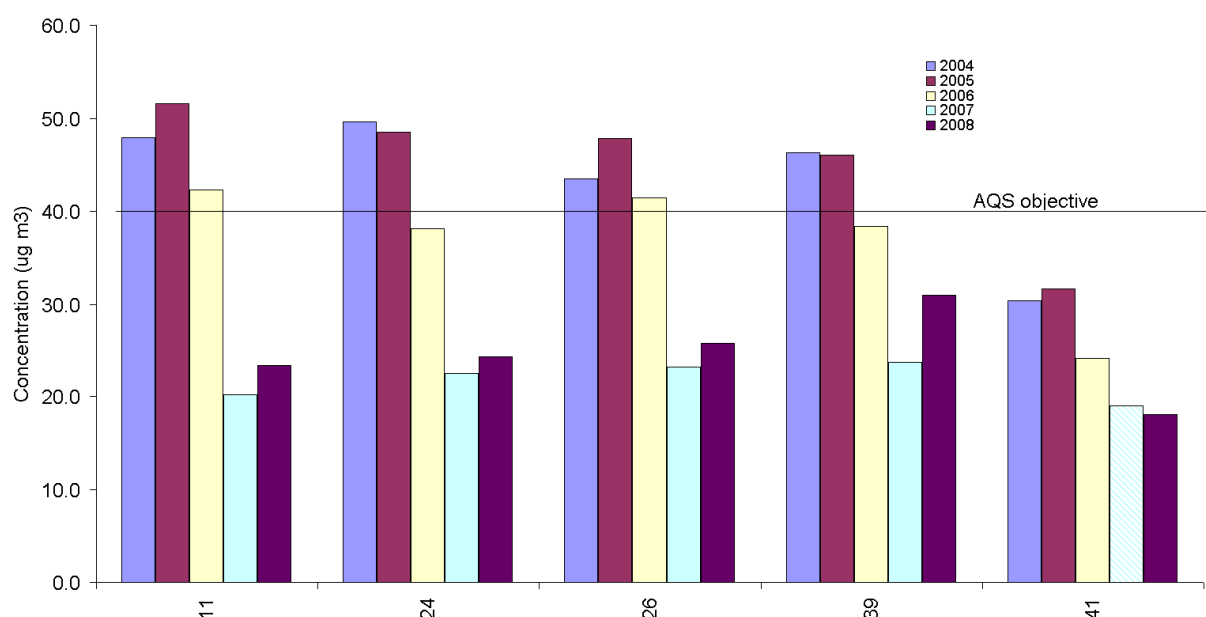
Figure 5 Bias adjusted annual mean NO_2 concentrations ($\mu\text{g m}^{-3}$) outside of the Bedford AQMA (2003 – 2008) (Note – sites with less than 9 months data capture and that have been adjusted are shown with a downward diagonal pattern)



The diffusion tube monitoring at Great North Road, Wyboston (A1) North (21, 22 and 23) consistently exceeded the $40 \mu\text{g m}^{-3}$ over the period reported. This site however does not represent relevant public exposure for this objective as reported in previous Council reports and as described in the government's TG09 guidance. Typical relevant public exposure for the annual mean objective relates to facades of public such as houses, hospitals and schools.

The monitoring at all the other sites shown for all years reported was below the $40 \mu\text{g m}^{-3}$ objective. For 2008, concentrations were higher than 2007 for the majority of sites shown. For one site (4) only 2008 recorded the lowest concentrations for the period shown. Concentrations at this background site have not exceeded $20 \mu\text{g m}^{-3}$ since 2005.

Figure 6 Bias adjusted annual mean NO₂ concentrations (µg m⁻³) at the revoked AQMA 4 in Great Barford (2003 – 2008) (Note – sites with less than 9 months data capture and that have been adjusted are shown with a downward diagonal pattern)



Four of the monitoring sites in Great Barford previously exceeded the annual mean objective, between 2004 and 2006. However since the opening of the A421 Great Barford by pass in late 2006, concentrations at the monitoring sites have reduced markedly, mostly to levels less than 30 µg m⁻³ in both 2007 and 2008. Thus vindicating the Council's decision to revoke AQMA 4 in Great Barford.

2.2.2 Sulphur dioxide

Monitoring at the background site in Stewartby ended in February 2009. The monitoring site had previously been in operation since 2001. The site was representative of relevant exposure, monitoring concentrations close to the brickworks in Stewartby. The monitoring site was funded in part by the UK government in response to the high concentrations of SO₂ that existed in the area and exceeded the air quality objectives (and EU Limit Values). The brick making at the industrial site stopped at the end of February 2008.

The Council also monitors SO₂ at its Kempston site, which opened in late 2006. This site also represents relevant exposure and is sited at a background location. It is sited further downwind of the brickworks at the edge of the town of Kempston.

The following tables provide the results for the period 2003 – 2008 at the Council's monitoring sites. The data capture for each year exceeded 85%, apart from 2005 at the Stewartby site and 2006 at the Kempston site (the site opened in late 2006).

Table 5 Number of periods exceeding SO₂ objective standards (2003 – 2008) at Stewartby

Objective	2003	2004	2005	2006	2007	2008
15min mean	118	135	43	38	56	0
Hourly mean	4	8	3	0	5	0
24hr mean	0	0	0	0	0	0
Data capture %	91	90	78	88	98	100

(NB 2008 results are provisional; bold indicates objective exceeded)

Table 6 Number of periods exceeding SO₂ objective standards (2006 – 2008) at Kempston

Objective	2006	2007	2008
15min mean	3	5	0
Hourly mean	<i>0</i>	<i>0</i>	<i>0</i>
24hr mean	<i>0</i>	<i>0</i>	<i>0</i>
Data capture %	25	89	98

(NB 2008 results are provisional; italics indicates that data capture less than 75%)

The 2008 results for both sites show that there were no periods when any of the standards were exceeded, confirming that the SO₂ pollution from the brick manufacture had ended.

In previous years the results show that the 15-minute objective of not more than 35 periods with concentrations greater than 266 µg m⁻³ was easily exceeded for all years at Stewartby, when the brickworks was operational throughout the year. The other objectives for the one-hour and 24-hour mean were not exceeded, although periods exceeding the hourly standard arose during all years other than 2006.

The results for the Kempston site also show that the 15-minute standard was exceeded during 2006 and 2007 only, although the number of periods was less than 35, hence the objective was not exceeded. The reduced levels monitored at this site reflect its greater distance from the brickworks.

A comparison of 99.9th percentile measurements for the Stewartby site also highlights that peak concentrations have reduced in 2008 from previous years, as might be expected with the brick manufacturing closing. (Note - the data are not fully ratified for 2008).

Table 7 Equivalent 99.9th percentile for 15-minute mean SO₂ at Stewartby (µg m⁻³)

	2006	2007	2008
99.9 th percentile	285.8	349.8	66.8

Plots of 15-minute SO₂ concentrations for 2008 for both sites are given in Appendix 1.

Road Traffic Sources

The focus of attention for road traffic sources is on those relevant locations close to busy roads, especially in congested areas and near to junctions, where traffic emissions are higher, and in built up areas where the road is canyon like and buildings restrict the dispersion and dilution of pollutants. Only those locations, which have not been assessed during the earlier rounds or where there has been a change or new development, are assessed.

The Council consolidated the previous smaller town centre AQMAs into the enlarged AQMA 5, which now encompasses the main routes through the town centre, as well as other busy streets where measured concentrations were found to exceed the annual mean objective for nitrogen dioxide.

3.1 Narrow congested streets with residential properties close to the kerb

Concentrations are often higher where traffic is slow moving, with stop/start driving, and where buildings on either side reduce dispersion. Screening models so far have not proved helpful at identifying potential exceedences, which have only been identified by monitoring. This assessment is for NO₂ only.

Previous Review and Assessments undertaken by the Council (Bedford 2006 and 2007) investigated the presence of narrow roads with residential properties close to the kerb. The revised TG09 guidance requires the identification of residential properties within 2 m of the kerb. Those roads applicable to Bedford were previously identified and are now included within the AQMA 5. No relevant newly identified congested streets outside of those already investigated have been found within the Borough.

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

3.2 Busy streets where people may spend 1 hour or more close to traffic

These include some street locations where individuals may regularly spend 1-hour or more, for example, streets with many shops and streets with outdoor cafes and bars, close to road traffic where there may be high concentrations of NO₂. (Note – that those people that are occupationally exposed in such locations are not included, as they are not covered by the regulations). This assessment is for NO₂ only.

The applicable roads have previously been identified in the Borough and include the High Street in Bedford and surrounding roads. All of these roads are included within the town centre AQMA, although 2008 measured concentrations did not exceed $60 \mu\text{g m}^{-3}$ in these roads, apart from Prebend Street, which has no shops, outside cafes, etc.

The Council confirms that there are no new or newly identified busy streets where people may spend 1 hour or more close to traffic in the Borough.

3.3 Roads with high flow of buses and/or HGVs

These can include street locations in the Borough where traffic flows are not necessarily high (i.e. fewer than 20,000 vehicles per day but more than 2,500 heavy duty vehicles) but where there are an unusually high proportion of buses and/or HGVs. The assessment is for both NO_2 and PM_{10} and is dependent on the proximity of relevant exposure within 10m of the kerbside.

The only roads identified from recent traffic counts with greater than 2,500 heavy duty vehicles in the Borough are two of the main trunk roads which are outside of built up areas. These are the A1 and A421. The A421 crosses the Borough, linking up the M1 and A1. Most of the road is dual carriageway and parts have been upgraded.

The Council's monitoring on the A1 near Wyboston confirmed that the annual mean objective for NO_2 was exceeded in 2008, although as reported earlier there is no relevant exposure at the monitoring location. No other relevant exposure has been identified within 10 m of either of the roads.

The Council confirms that there are no new or newly identified roads with high flows of buses or HGVs in the Borough.

3.4 Junctions

Concentrations are usually higher close to junctions, due to the combined impact of traffic emissions on roads forming the junction, and to the higher emissions due to stop start driving. The assessment is for both NO_2 and PM_{10} and is dependent on the proximity of relevant exposure within 10m of the kerbside.

The Council's amended AQMA 5 includes relevant junctions within Bedford. There is no other change to the previously reported situation concerning junctions and no new or newly identified junctions with relevant exposure within 10m.

The Council confirms that there are no new or newly identified busy junctions in the

Borough.

3.5 New roads constructed or proposed since the last round of review and assessment

The approach to considering new roads depends on whether or not an assessment was carried out in advance of building the new road. The assessment is for both NO₂ and PM₁₀ and is dependent on the proximity of relevant exposure within 10m of the kerbside.

The A421 Great Barford by pass was completed and opened in late 2006. This has greatly improved air quality within Great Barford as already outlined. Further improvements to the A421 to the east of Bedford are in progress. There have been no other new or proposed roads in the Borough where an air quality assessment was required.

The Council confirms that there are no relevant new or proposed roads in the Borough.

3.6 All roads with significantly changed traffic flows

Only roads with significantly changed traffic flows that have not already been considered above were investigated. The assessment is for both NO₂ and PM₁₀.

From the traffic data assessed there have been two roads in the Borough, which have experienced a significant increase in traffic flows between 2006 and 2007. These roads are the A421 and A6.

For the A421 this increase was on an upgraded section of this road, which bypasses Bedford and is to the south of the town, near Elstow. The revised flow on this section now reflects the flow on the next joining section of the A421 (to the east) of around 35,000 vehicles per day. There is no relevant exposure close to the road to either section.

The A6 section where there has been a significant increase is close to the town centre, just south of the river. It is within the amended AQMA 5 and therefore does not need further assessment.

The Council confirms that there are no new or newly identified roads with significantly changed traffic flows in the Borough, other than those already considered previously.

3.7 Bus and coach stations

This section only applies to bus stations or sections of bus stations that are not enclosed, and where there is relevant exposure, including at nearby residential properties. The assessment is for both the annual mean and the 1-hour NO₂ objectives. (Note - the term “bus” in this instance is used to signify both buses and coaches).

The bus station at Greyfriars in Bedford was assessed in earlier rounds of Review and Assessment. It is within the newly amended AQMA. Previous investigations found that this bus station did not need further investigation as there were less than 1000 buses flowing through it per day. There has been no change to this position. The bus station is also subject to a redevelopment proposal that will reduce its size, amend the nearby road layout and provide a superstore.

The Council confirms that the bus station in Bedford was assessed in previous rounds of review and assessment. These found that there are no there was no need to proceed to a Detailed Assessment.

4. Other Transport Sources

4.1 Airports

Aircraft are potentially significant sources of nitrogen oxides (NO_x) emissions, especially during takeoff. The revised guidance has used new information, which has resulted in the criteria to trigger a Detailed Assessment being relaxed, while the requirement to assess PM₁₀ has been removed. Thus this section only applies to NO₂. (Note – any road traffic using airports was considered in the previous section.)

In the Council's previous rounds of Review and Assessment it was confirmed that the nearest large airport is outside the Borough and therefore was not relevant. This situation has not changed.

The Council confirms that there are no relevant airports in the Borough.

4.2 Railways (diesel and steam trains)

Stationary locomotives, both diesel and coal fired, can give rise to high levels of sulphur dioxide (SO₂) close to the point of emission. Recent evidence also suggests that moving diesel locomotives, in sufficient numbers, can also give rise to high NO₂ concentrations close to the track where, along busy lines, emissions can be equivalent to those from a busy road.

Although diesel locomotives use rail lines through Bedford, these are not included on the list in Table 5.1 of TG09 of lines, which identify those lines with a "high" usage of diesel locomotives. Previous rounds of Review and Assessment also found that there are no areas within the Borough where diesel or steam locomotives are stationary for periods of 15 minutes or more, within 15m of where regular outdoor exposure arises. This situation has not changed.

4.2.1 Stationary Trains

The Council confirms that there are no locations where relevant exposure to emissions from steam or diesel trains arises within the Borough.

4.2.2 Moving Trains

The Council confirms that there are no locations where there are large movements of diesel locomotives and potential long-term relevant exposure within 30m.

4.3 Ports (shipping)

The assessment for shipping needs to consider SO₂ only. The Borough is land locked and therefore there are no ports or shipping within the Borough.

The Council confirms that there is no port or any shipping that meet the specified criteria within the Borough.

5. Industrial sources

The Council and Environment Agency (EA) control industrial sources within the Borough under the Pollution Prevention and Control Act 1999. The Council also has control over smaller industrial and commercial sources, largely through the Clean Air Act, with its associated control of the stack heights. As a result of these controls, there are relatively few sources that may be relevant under the Local Air Quality Management (LAQM) regime. Many of these sources were also addressed during previous rounds of Review and Assessment. The focus is thus on new installations and those with significantly changed emissions.

5.1 New or Proposed Industrial Processes

Industrial sources are considered unlikely to make a significant local contribution to annual mean concentrations, but could be significant in terms of the short-term objectives in the Borough. Sources in neighbouring authorities and the combined impact of several sources are considered. The approach used is based on use of the planning and permitting processes. The assessment considers all the LAQM pollutants, including those most at risk of requiring further work (SO₂, NO₂, PM₁₀ and benzene).

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

Since the last round of Review and Assessment no applications have been received for new or proposed sources where an air quality assessment has been needed. The waste incineration installation at Goosey Lodge at Wymington had a new combustion chamber fitted and it is now operating fully. This was assessed in the previous Review and Assessment.

The Council confirms that there are no relevant new or proposed industrial processes for which planning approval has been granted.

5.1.2 Existing Processes where emissions have increased substantially or new relevant exposure has been introduced

The lists of existing processes that are regulated under the Environmental Permitting regime are provided in the Appendix. These are all processes with low emissions of LAQM pollutants. None of these have increased emissions by greater than 30% and no new relevant exposure has been introduced nearby.

The Council confirms that there are no existing processes with substantially increased emissions or new relevant exposure.

5.1.3 New or significantly changed processes with no previous Air Quality Assessment

Since the last round of Review and Assessment no applications have been received for new or proposed sources where it has been determined that the installation is likely to give rise significant pollutant emissions.

The 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

This was previously assessed in earlier rounds of Review and Assessment and it was found that there are no major petrol storage depots in the Borough. This situation has not changed.

There are no major fuel (petrol) storage depots within the Council's area.

5.3 Petrol stations

There is some evidence that petrol stations could emit sufficient benzene to put the 2010 objective at risk of being exceeded, especially if combined with higher levels from nearby busy roads.

The previous round of Review and Assessment assessed all petrol stations with a throughput of more than 2000 m³ of petrol, and with a busy road nearby. None were found to have relevant exposure within 10m of the pumps and therefore it was not necessary to go to a Detailed Assessment. There has been no change in this situation for this round.

The Council confirms that there are no petrol stations meeting the specified criteria in the Borough.

5.4 Poultry farms

Some local authorities in England have identified potential exceedences of the PM₁₀ objectives associated with emissions from poultry farms (defined as chickens (laying hens and broilers), turkeys, ducks and guinea fowl). These relate to large farms (> 100,000 birds) that are regulated by the EA. None however exist within the Council's area.

The Council confirms that there are no poultry farms meeting the specified criteria in the Borough.

6. Commercial and Domestic Sources

6.1 Biomass combustion – Individual Installations

Biomass burning can lead to an increase in PM₁₀ emissions, from the combustion process itself and also aerosol formation from volatile materials distilled from the wood. Compared to conventional gas burning, biomass burning can also result in an increase in NO_x emissions due to the fuel-derived portion that is not present in gas combustion.

6.1.1 Individual installations

The Council has assessed for individual combustion plant burning biomass ranging from 20 MW down to 50 kW units. No biomass combustion plant was found in the Borough.

The Council confirms that there is no relevant biomass combustion plant in the Borough.

There is the potential that many small biomass combustion installations (including domestic solid-fuel burning), whilst individually acceptable, could in combination lead to unacceptably high PM₁₀ concentrations, particularly in areas where PM₁₀ concentrations are close to or above the objectives. The impact of domestic biomass combustion in most areas is thought to be small at the time of writing, but could become more important in future. However as reported above there is currently no biomass combustion plant was found in the Borough.

The Council confirms that there is no biomass combustion plant in the Borough.

6.2 Domestic Solid-Fuel Burning

The previous rounds of Review and Assessment identified areas where domestic solid fuel burning gives rise to exceedences of the objective for SO₂. PM₁₀ from domestic solid fuel burning was also covered above (6.1.2 Biomass combustion – combined impacts).

There are no areas of significant domestic solid fuel use in the Borough. This position has not changed from the previous USA in 2006, which confirmed that no areas of significant domestic solid fuel burning were identified. Gas is widely available across the Borough and it remains the predominant fuel used for domestic water and space heating.

The Council confirms that there are no areas of significant domestic fuel use in the Borough.

7. Fugitive or Uncontrolled Sources

Dust emissions from uncontrolled and fugitive sources can give rise to elevated PM₁₀ concentrations. These sources can include, but are not limited to: quarrying and mineral extraction sites, landfill sites, coal and material stockyards, or materials handling, major construction works and waste management sites. Dust arises from the passage of vehicles over unpaved ground and from the passage of vehicles along public roads that have been affected by dust and dirt tracked out from dusty sites. It also arises from the handling of dusty materials, the cutting of concrete etc. There is also wind-blown dust from stockpiles and dusty surfaces.

Although the Borough has a number of mineral extraction sites and landfill sites, previous rounds of Review and Assessment investigated these for fugitive and uncontrolled sources of pollution and found no potential sources with relevant exposure nearby. Based on professional experience and local knowledge this situation has not changed since the previous assessment. There have also been no complaints relating to potentially relevant sources in the Borough.

The Council confirms that there are no relevant potential sources of fugitive particulate matter emissions in the Borough.

8. Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

Monitoring within the Borough confirmed that the annual mean nitrogen dioxide objective has been exceeded widely in the town centre of Bedford, plus at a site close to the A1 near Wyboston. The site close to the A1 does not represent relevant exposure and was previously been assessed as not needing further investigation. The other sites in the Bedford town centre however do represent areas with relevant exposure and as a result of its assessments the Council consolidated its town centre AQMA's within an amended AQMA 5, which now includes the main centre of Bedford.

The Council has also recently installed a continuous site within the amended AQMA and indications from this site again confirm that the annual mean nitrogen dioxide objective has been exceeded.

There have been no other significant changes to NO₂ concentrations or emissions elsewhere in the Borough since the previous round of Review and Assessment. The Council will however maintain its monitoring programme and is planning a further continuous monitoring site in the town centre.

The Council also undertook monitoring for sulphur dioxide in Stewartby at a site representing relevant exposure. Previously the site recorded that the 15-minute objective for sulphur dioxide was exceeded. However in 2008 following the cessation of brick making at the nearby brickworks, emissions of sulphur dioxide greatly reduced leading to no periods where the sulphur dioxide standards were exceeded. This monitoring site closed in early 2009.

8.2 Conclusions from Assessment of Sources

The Council has assessed the likely impacts of local developments for road transport, other transport, industrial processes, commercial/domestic, fugitive emissions, residential and commercial sources. The findings have indicated that there are no new changes that require the Council to undertake a Detailed Assessment.

8.3 Proposed Actions

This report follows the technical guidance (TG09) produced for this part of the third round of Review and Assessment. It therefore fulfils this part of the continuing LAQM process.

The results, from following this methodology, are that the Council has not identified an additional risk of the air quality objectives for the LAQM pollutants: carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide and particles (PM₁₀), being exceeded anywhere in the Council's area. Thus the Council need not proceed beyond the updating and screening assessment for these pollutants.

The Council will therefore undertake the following actions:

1. Undertake consultation on the findings arising from this report with the statutory and other consultees as required.
2. To maintain existing sites throughout the Borough and expand monitoring within the amended AQMA 5.
3. Continue with the implementation of its Air Quality Action Plan in pursuit of the air quality objectives.
4. Prepare for the submission of its 2010 Progress Report.

9. References

Defra, 2007. Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volume 1). Defra, London. Cm 7169.

Defra, 2009a. Local Air Quality Management, Technical guidance LAQM.TG09. Defra, London.

Bedford Borough Council (2003). Local Air Quality Management – Updating and Screening Assessment 2003

Bedford Council (2004). Detailed Assessments reports for NO₂ and SO₂. 2004

Bedford Council (2005) Local Air Quality Management – Air Quality Progress Report. 2005

Bedford Borough Council (2006). Local Air Quality Management – Updating and Screening Assessment 2006

Bedford Borough Council (2007). Local Air Quality Management – Detailed Assessment 2007

Bedford Borough Council (2008) Local Air Quality Management – Progress Report. April 2008

Defra, 2009b. WASP – Annual Performance Criteria for NO₂ Diffusion Tubes used in Local Air Quality Management (LAQM), 2008 onwards and Summary of Laboratory Performance in Rounds 98-102. AEA February 2009.

Appendices

Table 8 List of Part A1 installations in the Council's area

Operator Name	Authorisation No.	Site address	Process type
Hanson Building Products Limited	BX1616IU	Stewartby Brickworks Bedfordshire	CERAMIC PRODUCTION
RWE NPOWER PLC	AJ2747	LITTLE BARFORD, ST. NEOTS, HUNTINGDON, CAMBRIDGESHIRE	COMBUSTION
BOURNS LTD	AL1008	MANTON LANE, BEDFORD, BEDFORDSHIRE	ORGANIC CHEMICALS
ONYX UK LTD	SHA008/75018	Treatment Plant, Green Lane, Stewartby, Beds, MK43 9LY	OTHER WASTE DISPOSAL
WOODBIDGE FOAM (UK) LTD	AT8894	CAXTON ROAD, ELMS INDUSTRIAL ESTATE, BEDFORD	ORGANIC CHEMICALS
ANCILLARY COMPONENTS LTD	AY2214	GOOSEY LODGE, WYMINGTON, RUSHDEN, NORTHAMPTONSHIRE	WASTE INCINERATION
DAWN MEATS	BX2086IB	MEADOW LANE CARDINGTON BEDFORD BEDFORDSHIRE	OTHER INDUSTRY
Wells & Youngs Brewing Company Limited	BN4690IK	THE EAGLE BREWERY HAVELOCK STREET BEDFORDSHIRE	OTHER INDUSTRY
DUSSEK CAMPBELL LTD	BP3138LN	LITTLE BARFORD STATION LITTLE BARFORD NEOTS BEDFORDSHIRE	POWER GASIFICATION, REFINING ETC

Table 9 List of permitted petrol stations in the Council's area

REF. No	TRADING NAME	ADDRESS
46	BP Bedford Bypass	A421/A6 Junction, Bedford Bypass
48	Richard Tebbutt Ltd	52-56 Stagsden Road, Bromham, Bedford
49	Sainsburys Limited	252/274 Bedford Road, Kempston, Bedfordshire
51	Sainsburys Limited	90 Clapham Road, Bedford
52	BP Safeway	Newham Avenue, Bedford
54	Tesco Stores Ltd	Riverfield Drive, Bedford
55	Tesco Stores Ltd	Cardington Road, Bedford
61	Kempston Filling Station	47 High Street, Kempston MK42 7BT
62	Murco Service Station	Allhallows Car Park, Hassett Street, Bedford
63	Esso Southgate	59 London Road, Bedford
64	Total Service Station	3 Elstow Road, Bedford
65	BP Service Station	A1 Southbound, Wyboston, Bedfordshire
66	Putnoe Service Station	122 Queens Drive, Putnoe, Bedford
69	Total Fina Black Cat Service Station	Great North Road, Chawston
70	Total Fina Kempston	Woburn Road, Kempston

78	Q8	GA Henman & Sons Ltd, 95 High Street, Clapham MK41 6AQ
79	Murco	Wootton Garage, 2 Fields Road, Wootton, MK43 9JJ
85	Turn Filling Station	Souldrop, Bedford, MK44 1HJ

Table 10 List of permitted dry cleaners in the Council's area

REF No	TRADING NAME	ADDRESS
81	Johnsons The Cleaners UK Ltd	15 Allhallows, Bedford, MK40 1LN
82	Johnsons The Cleaners UK Ltd	Tesco, Riverfield Drive, Bedford MK41 0SF
83	Clean Stream Dry Cleaners	58 Tavistock Street, Bedford, MK40 2RD

Table 11 Part B processes in the Council's area

REF No	TRADING NAME	ADDRESS
Non ferrous metals		
31	Caress Precision Products Ltd	Allington Road, Little Barford, St Neots
Production of cement and lime		
6	Hanson Aggregates	Bedford Plant, Cople Turn, Sandy Road, Cople, Bedford
8	Lafarge Aggregates Ltd	Cople Road, Willington, Beds
13	Cemex Materials	Great North Road, Wyboston, Beds
15	Cemex Materials	Manor Road, Kempston Hardwick
17	St Neots Premix	Ducks Cross, Wilden, Bedford
28	Supreme Concrete Ltd	Hardwick Hill Works, Ampthill Road, Kempston Hardwick
Other mineral industries		
16	Lafarge Aggregates	Elstow Depot, The Old Brickworks, Wilstead Road, Bedford
18	C Jackson & Son	Keysoe Road, Thurleigh
45	G Moore Haulage	Major Road, Kempston Hardwick, Beds
75	C Jackson & Son	Keysoe Road, Thurleigh
Crematoria		
39	Bedford Crematorium	Cemetery Complex, 104 Norse Road, Bedford
Small waste oil burner		
36	Tri D Motor Engineers	Bury Walk, Goldington
77	Brian Currie – Bedford	Brunel Road, Barkers Lane Industrial Estate, Bedford, MK41 9TG
87	MW & PV Ward	Brook End Farm, Riseley Road, Keysoe, Bedford, MK44 2HS
89	G Moore Haulage Ltd	Manor Road, Kempston Hardwick, MK43 9NT
Organic chemicals		
37	Interfoam Ltd	15/17 Ronald Close, Woburn Industrial Estate, Kempston
84	Interfoam Ltd	15/17 Ronald Close, Woburn Industrial Estate, Kempston
Tar and bitumen		
5	Elstow Roofing Products Ltd	Old Brickworks, Wilstead Road, Elstow
Coating activities, printing and textile treatments		
20	Select Plant Hire Company Ltd	Barford Road, St Neots
21	Evans Halshaw	Barkers Lane, Bedford
22	Mercedes Benz of Bedford	Ampthill Road, Bedford
25	ACR Auto Crash Repairs	Brunel Road, Barkers Lane, Bedford
32	VW Panels	302 Ampthill Road, Bedford
44	Brycol	3 Wilstead Industrial Estate, Wilstead
47	QA Accident Repair Centre	1 Lyon Close, Woburn Industrial Estate, Kempston
50	Paragon Automotive Ltd	Thurleigh Airfield Business Park, Thurleigh

Table 12 Unbiased 2008 monthly results

Site no.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	40	46	37	40	38		38	32	41	45	51	
2	31	32	19	26	20	18	18	16	22	28	31	
3	27	26	15	16	12	12	14	13	16	21	23	
4	21	31	16	21	20	13	5	10	24	24	20	
5	32	35	25	28	32	27	29	26	31	29	33	
6		68	28	33	36	30	29	24	32	37	40	
7	35	34	27	28	28	28	28	23	29	30	36	
8	27	34	22	23	20	18	19	18	26	29	34	
9	29	31	22	25	25	21	23	20	25	26	33	
10	33	32	23	27	24	21	25	25	27	29	31	
11	29	26	19	22	18	17	23	21	27	22	30	
12	25	27	18	27	31	18	21	19	27	24	29	
13			25	22	16		23	23	23	27	32	
14	32	38	27	40	42	28	31	21	41	37	37	
15	32	33	26	33	30	25	29	22	33	29	36	
16	32	34	25	35	40	22	30	22	36	33	36	
17	37	43	30	40	47	29	33	30	42	39	50	
18	37	41	27	31	26	23	23		30	34	38	
19	35	39	26	29	28	28	22	23	33	34	32	
20	63	67	60	65	48	67	65		57	66	61	
21	38	42	34	41	58	38	46	32	55		45	
22	43	49	32	52	62	35	46	38	53	40	51	
23	43	40	34	46	66	36	42	31		40		
24	28	28	22	23	23	20	21	23	25	22	29	
25	21	93	40	53	44	47	51	39	46	47	47	
26	26	28	22	25	28	22	24	22	29	25	30	
27	61	57	54	56	52	64	62	48	60	60	62	
28	36	45	38	48			38	31	46	42	48	
29	43	47	35	44	47	45	43	34	45	44	49	
30	60	53	53	51	38	58	49	45		51	59	
31	46	49	43	55	66	51		41	54	50	52	
32	39	58	50	59	73	54		34	61	53	59	
33	53	49	48	51	51	50	52	12	45	46	48	
34	43	50	43	56	55	48	44	36	52	51	54	
35	42	47	45	40	39	48	48	38	42	48	48	
36	38	42	35	42	55	43	43	32	49		47	
37		83	54	45	51	38	37	35	39	38	40	
38	46	56		65	82	51	52	45	61	57	58	
39		31	25	53	31	23	26	25	31	27	31	
40	23		24			27	24				35	
41	33	24	15	16	14	13	14	11	17	18	21	
42	42	49	47	55	63	48	46	38	50	43	58	
43		50	41	49	52	44	42	35	49	42	48	
44	28	43	41		50	43	39	33	47		48	
45	33	47	40	51	65	43	42	37	51	43	48	
46	38	46	39	43	43	43	36	37	41	40	49	

47	33	29	28	39	32	36
48	46	46	42	56	39	52
49	57	58	49	64	54	56
50	51	54	44	47	56	
51	44	53	40	53	48	51
52	45	46	35		45	55
53	38	40	36	50	41	43
54	41	39		44	42	42
55	41	40	40	45	47	
56	48	45	40	47		45
57	32	34		37	40	
58	27	28	27	34	36	38
59	38	44	39	42	42	
60	40	40	32	47	43	48
61	30	34	29	38		35
62	29	31	27	33	40	40
63	35	36	31	38	41	47
64	49	45				
65	36	34	26	38	36	

Figure 7 15-minute mean SO₂ concentrations at the Stewartby site for 2008

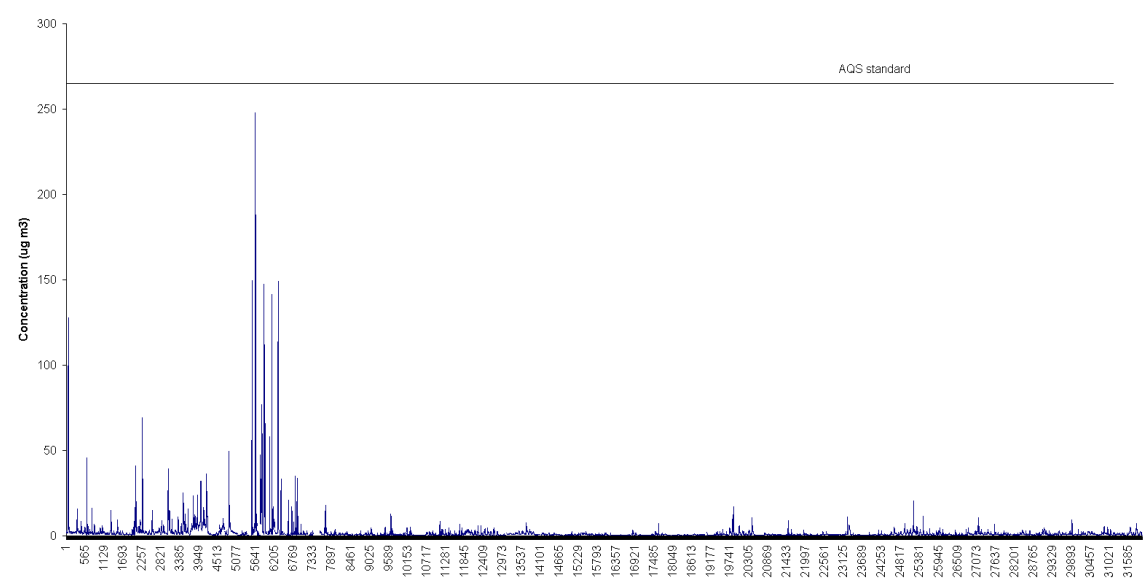


Figure 8 15-minute mean SO₂ concentrations at the Kempston site for 2008

