



NORWICH  
City Council

## ENVIRONMENT ACT 1995 PART IV

### LOCAL AIR QUALITY MANAGEMENT

Air Quality Review and Assessment  
Annual Progress Report 2007

City of Norwich

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# Executive Summary

The first round of review and assessment of air quality in Norwich was carried out in four stages to determine whether the national air quality objectives would be met by the end of 2005. The results of these assessments indicated that there were areas of Norwich almost certain to exceed the annual mean objective for Nitrogen Dioxide (NO<sub>2</sub>). Consequently, Norwich City Council declared three Air Quality Management Areas (AQMA's) on 1<sup>st</sup> June 2003 for NO<sub>2</sub> exceedance at St Augustines Street, Grapes Hill and the Castle area of Norwich. The location and extent of these three areas is shown in Appendix 1.

In conjunction with AEA Technology, Updating and Screening Assessments (USA's) of local air quality for Norwich were produced in January 2004 and March 2006. These reviewed the previous assessments undertaken for all pollutants identified in the Air Quality Regulations.

Where a significant risk of exceedance is identified for a pollutant, the local authority has to proceed to a Detailed Assessment (DA) the following year. However, the updating and screening assessments concluded that Norwich did not require a detailed assessment for NO<sub>2</sub>, PM<sub>10</sub>, Benzene, Carbon Monoxide, Lead, 1-3 Butadiene or Sulphur Dioxide. Where a local authority does not need to undertake a DA, a progress report is required instead. This report has therefore been produced as outlined in the Governments published guidance.

Air quality continues to be monitored in areas of Norwich in order to identify trends in pollution levels, and to assess progress towards achieving the annual average NO<sub>2</sub> objective in the three AQMA's.

# Introduction

The UK Government prepared the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland for consultation in 1999. It was published in January 2000 (DETR, 2000) with an addendum issued in February 2003. The AQS uses national air quality standards to enable air quality to be measured and assessed. These also provide the means by which objectives and timescales for the achievement of objectives can be set. These standards and objectives are shown in the following tables. The tables show the standards in mass concentrations ( $\mu\text{g}/\text{m}^3$  or  $\text{mg}/\text{m}^3$ ) with the number of exceedances that are permitted (where applicable).

The air quality standards and objectives set out in the Air Quality Regulations provide the statutory basis for the system of Local Air Quality Management (LAQM).

Air quality *standards* (in the UK AQS) are the concentrations of pollutants in the atmosphere that can broadly be taken to achieve a certain level of environmental quality. The standards are based on assessment of the effects of each pollutant on human health including the effects on sensitive subgroups. The standards have been set at levels to avoid significant risks to health.

The *objectives* of the UK air quality policy are framed on the basis of the recommended standards. The objectives are based on the standards, but take into account feasibility, practicality, and the costs and benefits of fully complying with the standards.

In areas where an air quality objective is not anticipated to be met, Local Authorities are required to declare Air Quality Management Areas (AQMA's) and implement action plans to improve air quality.

In most local authorities in the UK, objectives were (or will be) met for most of the pollutants within the timescale of the objectives shown in table 1. It is important to note that the objectives for  $\text{NO}_2$  remain provisional.

**Table 1 - Objectives included in the Air Quality Regulations 2000 and (Amendment Regulations 2002 for the purposes of LAQM**

Pollutant	Objective	Measured as	To be achieved by
Benzene	16.25 µg/m <sup>3</sup>	Running Annual Mean	31/12/2003
	5 µg/m <sup>3</sup>	Annual Mean	31/12/2010
1,3-Butadiene	2.25 µg/m <sup>3</sup>	Running Annual Mean	31/12/2003
Carbon monoxide	10.0 mg/m <sup>3</sup>	Maximum daily running 8 Hour Mean	31/12/2003
Lead	0.5 µg/m <sup>3</sup>	Annual Mean	31/12/2004
	0.25 µg/m <sup>3</sup>		31/12/2008
Nitrogen dioxide*	200 µg/m <sup>3</sup> Not to be exceeded more than 18 times per year	1 Hour Mean	31/12/2005
	40 µg/m <sup>3</sup>	Annual Mean	31/12/2005
Particles (PM <sub>10</sub> ) (gravimetric)	50 µg/m <sup>3</sup> Not to be exceeded more than 35 times per year	24 Hour Mean	31/12/2004
	40 µg/m <sup>3</sup>	Annual Mean	31/12/2004
Sulphur dioxide	266 µg/m <sup>3</sup> Not to be exceeded more than 35 times per year	15 Minute Mean	31/12/2005
	350 µg/m <sup>3</sup> Not to be exceeded more than 24 times per year	1 Hour Mean	31/12/2004
	125 µg/m <sup>3</sup> Not to be exceeded more than 3 times per year	24 Hour Mean	31/12/2004

\* The objectives for nitrogen dioxide are provisional

**Table 2 - Air Pollution Bandings and Index and the Impact on the Health of People who are Sensitive to Air Pollution**

<b>Banding</b>	<b>Index</b>	<b>Health Descriptor</b>
<b>Low</b>	1	Effects are unlikely to be noticed even by individuals who know they are sensitive to air pollutants
	2	
	3	
<b>Moderate</b>	4	Mild effects, unlikely to require action, may be noticed amongst sensitive individuals.
	5	
	6	
<b>High</b>	7	Significant effects may be noticed by sensitive individuals and action to avoid or reduce these effects may be needed (e.g. reducing exposure by spending less time in polluted areas outdoors). Asthmatics will find that their 'reliever' inhaler is likely to reverse the effects on the lung.
	8	
	9	
<b>Very High</b>	10	The effects on sensitive individuals described for 'High' levels of pollution may worsen.

**Table 3 - Boundaries Between Index Points for Each Pollutant**

Band	Index	Ozone *		Nitrogen Dioxide		Sulphur Dioxide		Carbon Monoxide		PM <sub>10</sub> Particles
		8 hourly running mean or hourly mean		hourly mean		15 minute mean		8 hour running mean		24 hour running mean
		µg/m <sup>3</sup>	ppb	µg/m <sup>3</sup>	ppb	µg/m <sup>3</sup>	ppb	mg/m <sup>3</sup>	ppm	µg/m <sup>3</sup>
<b>Low</b>										
	1	0-32	0-16	0-95	0-49	0-88	0-32	0-3.8	0.0-3.2	0-16
	2	33-66	17-32	96-190	50-99	89-176	33-66	3.9-7.6	3.3-6.6	17-32
	3	67-99	33-49	191-286	100-149	177-265	67-99	7.7-11.5	6.7-9.9	33-49
<b>Moderate</b>										
	4	100-126	50-62	287-381	150-199	266-354	100-132	11.6-13.4	10.0-11.5	50-57
	5	127-152	63-76	382-476	200-249	355-442	133-166	13.5-15.4	11.6-13.2	58-66
	6	153-179	77-89	478-572	250-299	443-531	167-199	15.5-17.3	13.3-14.9	67-74
<b>High</b>										
	7	180-239	90-119	573-635	300-332	532-708	200-266	17.4-19.2	15.0-16.5	75-82
	8	240-299	120-149	363-700	333-366	709-886	267-332	19.3-21.2	16.6-18.2	83-91
	9	300-359	150-179	701-763	367-399	887-1063	333-399	21.3-23.1	18.3-19.9	92-99
<b>Very High</b>										
	10	360 or more	180 or more	764 or more	400 or more	1064 or more	400 or more	23.2 or more	20 or more	100 or more
* Note that in view of the transboundary nature of this pollutant, and thus the limited effectiveness of action on a local scale, Ozone is not included in the regulations for air quality management										

# Purpose of the Progress Report

Progress Reports were introduced into the LAQM system following a detailed evaluation of the first round of local authority review and assessments. A need was identified to develop a longer-term vision for both LAQM and the review and assessment process. The process was seen to be too stop-start, possibly resulting in gaps of several years between air quality reviews.

Updating and screening assessments are now required at three yearly intervals, while annual progress reports maintain continuity in the intervening years. This encourages the integration of LAQM into the routine work of local authorities, and is intended to assist local authorities by:-

- helping retain a profile for LAQM within the authority, including the retention of staff with a knowledge of air quality issues
- providing a means for communicating air quality information to members and the public
- maximising the usefulness and interpretation of the monitoring effort being carried out by the local authority
- maximising the value of the investment in monitoring equipment
- making the next round of review and assessment that much easier, as there will be a readily available up-to date source of information
- helping local authorities respond to requests for up-to-date information on air quality
- providing information to assist in other policy areas, such as transport and land use planning
- providing a ready source of information on air quality for developers carrying out environmental assessments for new schemes
- demonstrating progress with implementation of air quality Action Plans and/or air quality strategies
- providing a timely indication of the need for further measures to improve air quality, rather than delaying until the next full round of review and assessment



# New Monitoring Results

Norwich has two automatic monitoring sites within its boundaries funded by the Dept of the Environment, Food and Rural Affairs (Defra). The Norwich Centre site is part of their Automated Urban and Rural Network (AURN), and the council owned Norwich Forum Roadside site is affiliated to the AURN. Norwich Centre is an 'urban centre' site<sup>1</sup> whilst Norwich Forum Roadside is a 'roadside' site<sup>2</sup>.

The council also operates a mobile air quality monitoring station as part of the AEAT 'Calibration Club'. The QA/QC for this partnership is in line with that for the AURN. The unit is currently located on Castle Meadow, which is within the Castle AQMA. It moved to this site in May 2006.

The Norwich Centre analysers were exchanged for Horiba units during 2006 and the mobile site uses an Ambirak analyser. These continuously monitor NO<sub>2</sub>, CO, SO<sub>2</sub> and PM<sub>10</sub>. The Norwich Forum Roadside site monitors NO<sub>2</sub> only.

All automatic data contained within this report has been fully ratified by AEA Technology unless otherwise stated. Data capture is at least 90% except where quoted.

Estimated background air pollution data for the Norwich City area can be viewed at:

[http://www.airquality.co.uk/archive/laqm/tools/187\\_2004.csv](http://www.airquality.co.uk/archive/laqm/tools/187_2004.csv)

1. Urban Centre - Non-kerbside sites located in an area representative of typical population exposure in town or city centre areas eg pedestrian precincts and shopping areas. Sampling heights are typically within 2-3m.
2. Roadside - Sites with sample inlets between 1m of the kerbside of a busy road and the back of the pavement. Typically this will be within 5m of the kerbside. Sampling heights are within 2-3m.

## **Benzene**

In 2003 the average background benzene concentration, estimated from the UK background maps, was  $0.6 \mu\text{g}/\text{m}^3$  as an annual mean, and the maximum background level was  $0.8 \mu\text{g}/\text{m}^3$ .

The projected average background benzene concentration estimated for 2010 is  $0.5 \mu\text{g}/\text{m}^3$ , and the maximum background level is  $0.6 \mu\text{g}/\text{m}^3$ .

Measurements using diffusion tubes at three locations in Norwich (Unthank Rd, Guildhall and St Augustines St) showed a maximum annual mean for 2006 of  $3.69 \mu\text{g}/\text{m}^3$  at St Augustines Street. This concentration does not exceed the air quality objective of  $16.25 \mu\text{g}/\text{m}^3$ . Monthly average concentrations for 2006 are shown in Appendix 2.

## **1,3-Butadiene**

In 2003 the average background 1,3-butadiene concentration, estimated from the UK background maps, was  $0.2 \mu\text{g}/\text{m}^3$  as an annual mean, and the maximum was  $0.3 \mu\text{g}/\text{m}^3$ .

There are no authorised industrial processes within Norwich that have the potential to emit significant quantities of 1,3-butadiene.

No monitoring of 1,3-butadiene has been undertaken by Norwich City Council.

## **Carbon Monoxide (CO)**

There were no exceedences of the air quality strategy objective of  $10 \text{mg}/\text{m}^3$  for carbon monoxide in Norwich during 2006.

Monitoring data is available for carbon monoxide from the Norwich Centre site. In 2006, summary statistics from this site showed a maximum 8-hour running mean of  $1.9 \text{mg}/\text{m}^3$ .

Data from the mobile monitoring unit for the period 10<sup>th</sup> May to 31<sup>st</sup> December 2006 (Castle Meadow), showed a maximum 8-hour running mean of  $2.2 \text{mg}/\text{m}^3$ .

Further monitoring data for carbon monoxide is available for the Norwich City area on the UK National Air Quality Information Archive website at [www.airquality.co.uk](http://www.airquality.co.uk)

## **Lead (Pb)**

Only one potential source of exceedence was revealed during the stage 1 review and assessment. This was screened out during stage 2. There are no authorised industrial processes within Norwich that have the potential to emit significant quantities of lead. It is expected that the objectives for lead will be achieved for 2008.

## **Fine Particles (PM<sub>10</sub>)**

The UK Government and the devolved administrations have adopted two air quality objectives for fine particles (PM<sub>10</sub>), which are equivalent to the EU Stage 1 limit values in the first Air Quality Daughter Directive. The objectives relevant to Norwich City Council are 40 µg/m<sup>3</sup> as the annual mean, and 50 µg/m<sup>3</sup> as the fixed 24 hour mean to be exceeded on no more than 35 days per year, to be achieved by the end of 2004. In addition there is an objective of 50 µg/m<sup>3</sup> as the fixed 24 hour mean to be exceeded on no more than 7 days per year, and 20 µg/m<sup>3</sup> as the annual mean to be achieved by the end of 2010. The objectives are based upon measurements carried out using the European gravimetric transfer reference sampler or equivalent.

It should be noted that the objectives for 2010, based on the Stage 2 EU Limit Values have not been included in the Air Quality Regulations for England, and local authorities are not currently required to assess against them. In addition, they were the subject of the EC's recent review of the First Daughter Directive.

The Commission is currently consulting on a new consolidated Directive on Ambient Air Quality, which is likely to see changes to the above limit values, though the nature of these changes cannot be confirmed at this time.

Results from the Norwich Centre site showed that PM<sub>10</sub> concentrations were recorded in the Defra 'moderate' band on 70 occasions over six days in 2006. This band covers the range of 50

to  $74 \mu\text{g}/\text{m}^3$  expressed as a 24hr running mean. The maximum 24hr running mean was  $55 \mu\text{g}/\text{m}^3$ .

The objective value of  $50 \mu\text{g}/\text{m}^3$  based on daily gravimetric equivalent data was exceeded on 2 occasions during 2006. The objective allows up to 35 exceedences per year. The mean concentration of  $24 \mu\text{g}/\text{m}^3$  gravimetric equivalent was below the annual mean objective value of  $40 \mu\text{g}/\text{m}^3$ .

Provisional results from the mobile site based at Castle Meadow during the period 10<sup>th</sup> May to 31<sup>st</sup> December 2006, showed that PM<sub>10</sub> concentrations were recorded in the Defra 'moderate' band on 9 occasions. The objective value of  $50 \mu\text{g}/\text{m}^3$  based on daily gravimetric equivalent data was exceeded on 6 occasions during this period. The objective allows up to 35 exceedences per year. The mean concentration of  $24 \mu\text{g}/\text{m}^3$  gravimetric equivalent, was below the annual mean objective value of  $40 \mu\text{g}/\text{m}^3$ . Note that the data from 1<sup>st</sup> September 2006 is provisional and may be subject to further quality control. The analyser recorded a data capture of 89.7% during this period.

### **Sulphur Dioxide (SO<sub>2</sub>)**

There were no exceedences of the air quality strategy objectives for sulphur dioxide at the Norwich Centre site in 2006. Monitoring data is available for SO<sub>2</sub> from this site, and in 2006 summary statistics showed a maximum 24-hour mean of  $9 \mu\text{g}/\text{m}^3$ , with a daily maximum of  $21 \mu\text{g}/\text{m}^3$ .

Data from the mobile site at Castle Meadow for the period 10<sup>th</sup> May to 31<sup>st</sup> December 2006 showed a maximum 24-hour mean of  $36 \mu\text{g}/\text{m}^3$ , a maximum hourly mean of  $74 \mu\text{g}/\text{m}^3$ , and a maximum 15 minute mean of  $101 \mu\text{g}/\text{m}^3$ . The analyser recorded a data capture of 89.6% during this period. The data from 1<sup>st</sup> September 2006 is provisional and may be subject to further quality control.

There were no exceedences of the air quality strategy objectives for sulphur dioxide at the Castle Meadow site in 2006.

Further monitoring data for sulphur dioxide is available for the Norwich City area on the UK National Air Quality Information Archive website at [www.airquality.co.uk](http://www.airquality.co.uk)

## Nitrogen Dioxide (NO<sub>2</sub>)

Nitrogen Dioxide and Nitric Oxide are both oxides of nitrogen, which together are referred to as NO<sub>x</sub>. All combustion processes produce some NO<sub>x</sub>, but only NO<sub>2</sub> is associated with adverse effects on human health. NO<sub>2</sub> is mainly a secondary pollutant formed by the oxidation of nitric oxide in the atmosphere. On a national level, the principal source of NO<sub>x</sub> emissions is road transport, which accounted for about 40% of total UK emissions in 2003. Within most urban areas the contribution from road transport will be much higher, and in the absence of localised point sources will account for the majority of the NO<sub>2</sub> present. Measures to reduce traffic pollution will therefore play a major role in meeting the air quality objective for NO<sub>2</sub>. Such schemes have been included in Norwich's Air Quality Action Plan, which was submitted to Defra in 2004.

### Automatic Monitoring

Monitoring data is available for NO<sub>2</sub> from the Norwich Centre site. In 2006, statistics for this site showed a maximum hourly mean of 92 µg/m<sup>3</sup> with an annual mean of 21 µg/m<sup>3</sup>. These concentrations do not exceed the air quality objectives. The data from 1st October 2006 is provisional and may be subject to further quality control. Daily average concentrations for 2006 from this site are shown in Appendix 2.

Monitoring data is also available for NO<sub>2</sub> from the Norwich Forum Roadside site. In 2006, statistics for this site showed a maximum hourly mean of 187 µg/m<sup>3</sup> during December, with an annual mean of 34 µg/m<sup>3</sup>. These concentrations do not exceed the air quality objectives. The data from 1st October 2006 is provisional and may be subject to further quality control. Daily average concentrations for 2006 from this site are also shown in Appendix 2.

Data from the mobile site at Castle Meadow for the period 10<sup>th</sup> May to 31<sup>st</sup> December 2006 showed a maximum hourly mean of 210 µg/m<sup>3</sup> during December. This was the only exceedance of the hourly mean objective value of 200 µg/m<sup>3</sup>. The objective allows up to 18 exceedances per year. The annual mean figure of 51 µg/m<sup>3</sup> represents an exceedance of the annual air quality objective of 40

$\mu\text{g}/\text{m}^3$ . The data from 1st September is provisional and may be subject to further quality control.

As the monitoring period for this site covered less than 9 months of the year, a period adjustment calculation (detailed in the LAQM.TG(03) guidance) has been carried out. Data over the full 2006 period from Cambridge Roadside and Norwich Centre have been used to calculate the ratios applied to the data from the mobile site. These calculations are summarised in the table below. As can be seen, the adjusted annual mean is  $51.57 \mu\text{g}/\text{m}^3$ .

Further monitoring data for Nitrogen dioxide is available for the Norwich City area on the UK National Air Quality Information Archive website at [www.airquality.co.uk](http://www.airquality.co.uk)

Table 4 - Period Adjustment of Data from Norwich Mobile (Castle Meadow)			
Site	Annual Mean $\mu\text{g}/\text{m}^3$	Period Mean (01/06/06 – 31/12/06) $\mu\text{g}/\text{m}^3$	Ratio
Norwich Centre	20.60	19.97	1.03
Cambridge Roadside	44.94	44.77	1.00
<b>Average Ratio</b>			<b>1.02</b>
Norwich Mobile	51.57	50.56	

### Non-Automatic Monitoring

In 2006 the council monitored  $\text{NO}_2$  at 32 locations throughout the City using diffusion tubes on a monthly exposure basis. The tubes are supplied and analysed by Gradko International Ltd. The method of preparation is 50% TEA/Acetone, and the values are blank corrected using travelling blanks. Gradko's quality control includes measuring tubes spiked with a known concentration of nitrite solution and measurement of stock solution received from AEAT. The laboratory is assessed annually by UKAS to establish conformance of their Laboratory Quality Procedures to the requirements of ISO/IEC 17025 Standard.

Three diffusion tubes are co-located with the Norwich Centre site in St Georges Street. Using the mean concentrations measured by

these three tubes, along with the same period concentrations measured by the automatic analyser, it has been possible to calculate a local bias adjustment factor of 0.98 using the Netcen spreadsheet available from the following website:

<http://www.airquality.co.uk/archive/laqm/tools.php>

The diffusion tube precision was good and the overall data capture from the automatic analyser was also good. The results in this progress report have therefore been adjusted for bias using this factor where shown. Screen shots of the completed Netcen precision and bias calculation spreadsheet is shown in Appendix 2.

As always, occasional vandalism or thefts of tubes from a few sites lead to some loss of data for the year. However, the loss of data has reduced from 2005, and was very slight overall. Monitoring data from our diffusion tube study is included in Appendix 2.

At the end of 2006 a rationalisation of the tube locations was carried out. This resulted in several of the tubes being relocated to more relevant sites (in terms of public exposure), usually on building facades. The results of this revised monitoring regime will be available for next years report. Also included in Appendix 2 are projected concentration levels for 2010, based on the 2006 data.

A table showing the summary data for NO<sub>2</sub> in 2006 is given in Appendix 2. As can be seen, there are six locations that predict an exceedance of the 2005 annual mean objective of 40 µg/m<sup>3</sup> that are not currently within any of the AQMA's. These locations are as follows:

#### 1. Vulcan Road

Vulcan Road is a main arterial road through a very large industrial estate to the north of Norwich. The area contains many varied commercial and industrial premises, including some authorised processes and a bus depot. The diffusion tube is within 2m of the roadside. There is no public exposure relevant to the annual mean objective for NO<sub>2</sub> at this location.

## 2. Tombland

Tombland is a busy thoroughfare in an old part of Norwich, close to the Cathedral. It is bounded on all sides by commercial premises, public houses and restaurants. The diffusion tube is at the kerbside. There is currently no public exposure relevant to the annual mean objective for NO<sub>2</sub> at this location.

## 3. St Vedast Street

## 4. Riverside

These streets are in reasonably close proximity to one another, and the diffusion tubes are at kerbside locations. The area consists of commercial premises, public houses, nightclubs and restaurants. There is no public exposure relevant to the annual mean objective for NO<sub>2</sub> at these locations.

## 5. St Stephens Street (mid)

St Stephens Street is a busy through road for the centre of Norwich. It is one of the main shopping areas in the city, consisting mainly of large department stores. There is no public exposure relevant to the annual mean objective for NO<sub>2</sub> at this location.

## 6. Exchange Street

This is a busy exit route from the City centre. It is a canyon street in an old part of Norwich. It is lined by commercial premises, public houses and restaurants. The diffusion tube is at the kerbside. There is currently no public exposure relevant to the annual mean objective for NO<sub>2</sub> at this location.

The remaining five locations that are shown with an exceedance of the 2005 annual mean objective of 40 µg/m<sup>3</sup> are all within the current AQMA's. The 2004 action plan that was produced in conjunction with Norfolk County Council sets out the proposals to address the air quality within these areas. Progress towards achieving the aims is given in Appendix 3.



# New Local Developments

## Industry

- No new industrial processes (A1 or A2) commenced operation during 2006, and overall, the number of Part B processes authorised during the year remained static.
- There were no new landfill or mineral developments during the year. No such activities are currently carried out within Norwich City Council's administrative area.
- There are no significant industrial developments due for commencement in the near future planned for the City.

## Housing and Redevelopment

- The large retail shopping mall and car park at Chapelfield Road opened in September 2005. The development was on the site of a former factory and public car park. It is not anticipated that in the longer term this redevelopment will impact significantly on air quality over the previous land use, although additional monitoring was put in place to assess any changes that may occur. The diffusion tube for the Chapelfield Road/Crescent site, which was opposite the main car park entrance, showed an annual corrected mean of  $40 \mu\text{g}/\text{m}^3$  for 2006, but was at the roadside, and therefore not relevant to the annual mean objective for  $\text{NO}_2$ . It was therefore relocated in January 2007 to the façade of the nearest domestic premises in the Crescent to assess the mean concentration with relevant public exposure.
- Several other small to medium scale developments are currently under construction within the City, mostly for housing. The Duke Street multi storey car park opened in June 2005. This was a direct replacement of a previous multi storey car park on the same site. The redevelopment of the former Bowthorpe School grounds for housing and a new fire station is continuing, as is the regeneration of the Riverside and King Street areas of Norwich. It is not anticipated that these developments will impact significantly on air quality once completed.

## Road Network Changes

- Several temporary road closures, lane restrictions or diversions were again experienced within Norwich during 2006. These were mainly short term and in connection with minor road layout changes/improvements etc. Consultations are taking place with interested parties on a redesign of the road layout and traffic flow in the St Georges Street/Elm Hill area of Norwich. This is a very old part of the City with many narrow cobbled streets. The proposals include closing some roads and making others one-way etc. It is likely that the changes to the area will be made in the next twelve months.
- A significant number of changes to the number and location of bus lanes were made during 2004. Several new lanes and contra flows were introduced to speed up bus journeys. This work involved many changes to the traffic light network to facilitate the introduction of the new lanes.
- New park and ride sites also came on line during 2004. These are operated by Norfolk County Council. There are now six in total, more than any other city in the UK. They are located on the main routes into Norwich City centre, and provide over 5000 spaces. In 2005/06 more than 3.7 million passengers used the Park and Ride system.

# Additional Information

## Action Plan Progress Report

In March 2005 Defra issued an addendum to their LAQM Policy guidance. The revised guidance removes the requirement to produce separate air quality action plans where an air quality problem arises because of transport pollution. Instead, Local Authorities are free to address this through their Local Transport Plan (LTP). It is the intention of Norwich City Council to integrate their action plan within the LTP in partnership with Norfolk County Council. The table in Appendix 3 gives details on progress with the contents of the action plan.

Of the ten monitoring sites set up within the AQMA's, five have measured concentrations greater than  $40 \mu\text{g}/\text{m}^3$ . Four of the sites within the Grapes Hill AQMA, however, have measured concentrations significantly below the objective. The remaining site within this area has a recorded concentration just above the objective ( $41 \mu\text{g}/\text{m}^3$ ). This tube, however, is mounted on a lamp column on a traffic island close to a roundabout. The nearest residential receptors to it are in Johnson Place (outside of the AQMA), approximately 30m from the measurement location. Since the only tube recording a concentration exceeding the objective within this AQMA does not represent relevant public exposure, it may be possible to revoke this AQMA. To further assess this, the Johnson Place tube was relocated to the façade of the residential dwellings in January 2007, in order to determine the mean concentration with relevant public exposure. It is anticipated that monitoring of the Grapes Hill AQMA will continue for at least another year to fully quantify the current situation and assess any trends that may be apparent.

## **Radiation Monitoring**

Norwich City Council is a member of the Norfolk Local Authorities Radiation Monitoring Group (NLARMG). The group carry out measurements of the external background Gamma radiation levels across the county of Norfolk. Data from this monitoring is submitted via Norfolk County Council to the Radioactive Incident Monitoring Network (RIMNET) who are the Radiation Monitoring face of DEFRA.

The group was previously accredited to the Local Authority Radiation Network (LARNet), who audited the members and results for quality control. Unfortunately, this organisation was disbanded in 2006. Despite this, the Norfolk group decided to continue to monitor radiation levels in the county. RIMNET were consulted on this issue, and were happy to continue to accept the data on the premise that we had many years of experience in measurement.

Norwich has six sites that were monitored on a monthly basis during 2006. Technical problems with the equipment led to the loss of some data early in the year however. Results of the monitoring carried out in 2006 are given in Appendix 2.

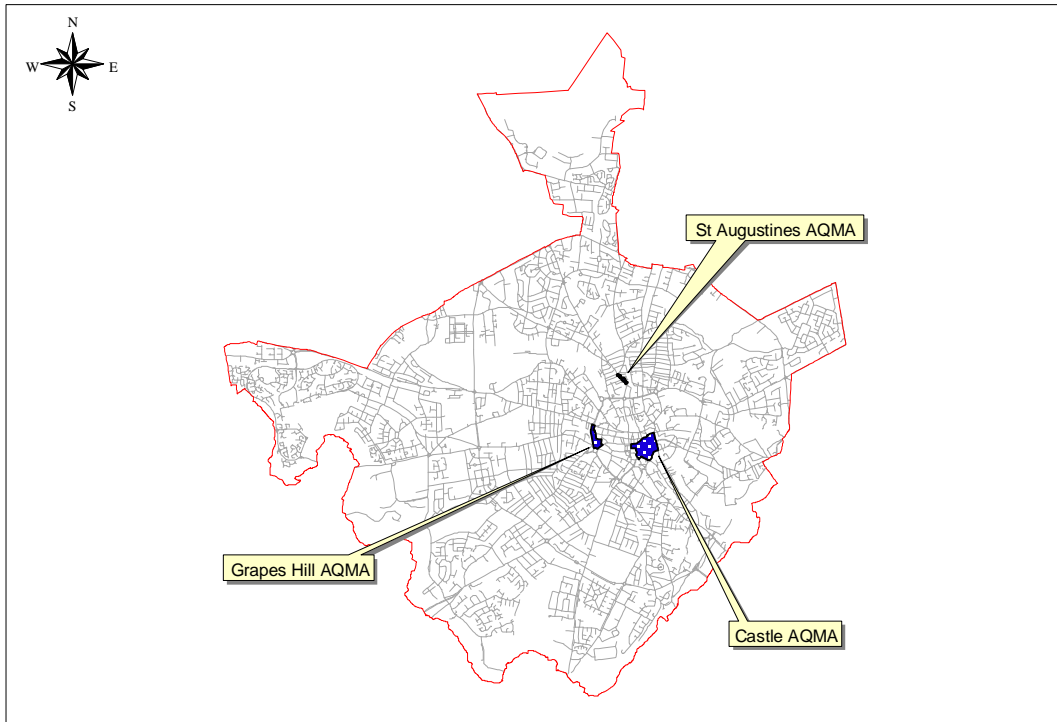
# Appendix 1

## Air Quality Management Areas in Norwich

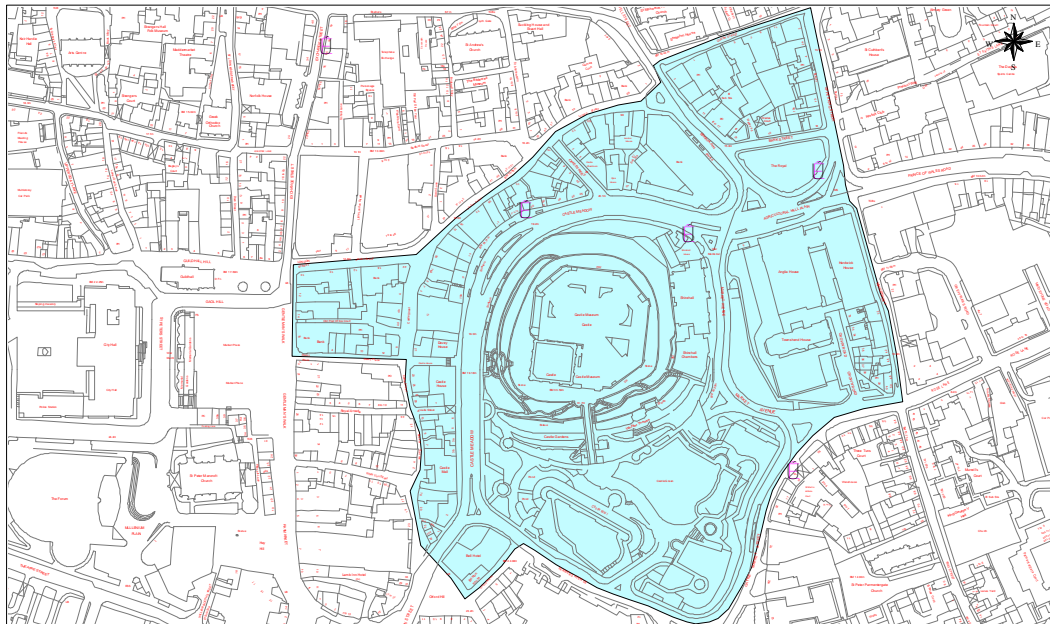
### CONTENTS

- \* Overview map
- \* Castle AQMA
- \* Grapes Hill AQMA
- \* St Augustines AQMA

# Air Quality Management Areas in Norwich



## Castle AQMA

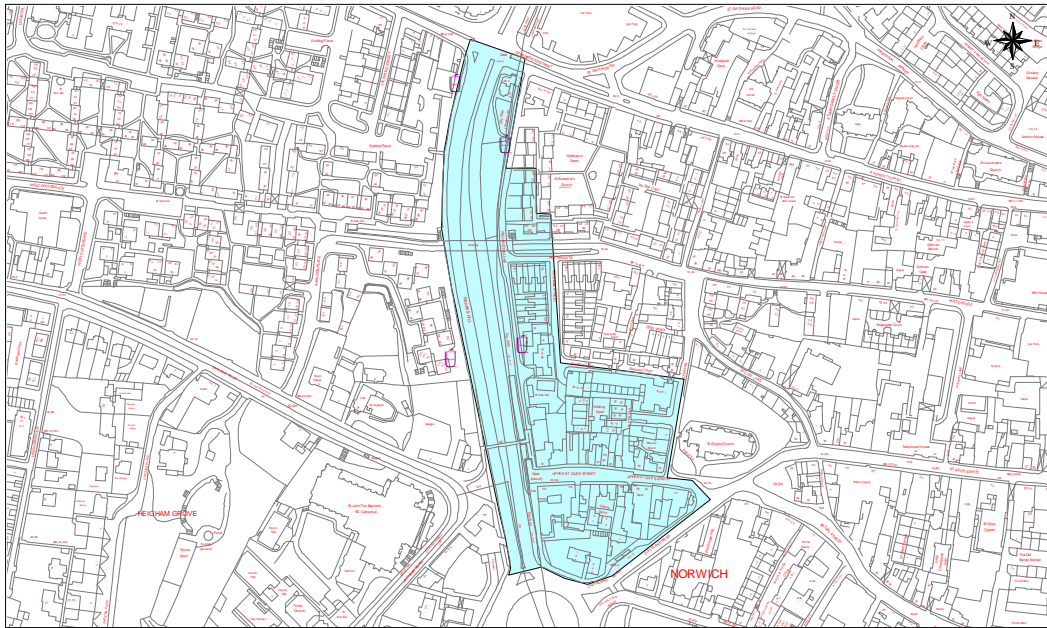


**NORWICH**  
City Council

Norwich City Council Environmental Protection Section  
Drawing Title: Castle AQMA Showing  
Position of NO<sub>2</sub> Diffusion Tubes  
Date Printed: 09/03/07  
Scale: 1:2500

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Historic Land Use data © Landmark Information Group Ltd 2005

# Grapes Hill AQMA

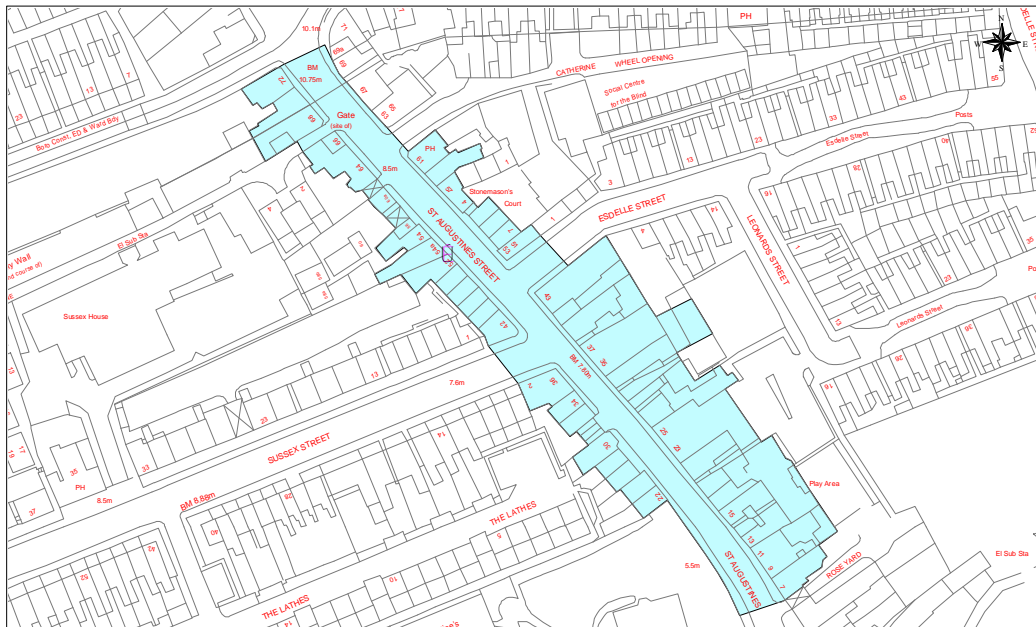


**NORWICH**  
City Council

Norwich City Council Environmental Protection Section  
 Drawing Title: Grapes Hill AQMA Showing  
 Position of NO2 Diffusion Tubes  
 Date Printed: 09/03/07  
 Scale: 1:2500

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# St Augustines AQMA



**NORWICH**  
City Council

Norwich City Council Environmental Protection Section  
 Drawing Title: St Augustines AQMA Showing  
 Position of NO2 Diffusion Tube  
 Date Printed: 09/03/07  
 Scale: 1:1000

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# Appendix 2

## Monitoring Data

### CONTENTS

Benzene diffusion tube results 2005/2006

Norwich Centre daily mean NO<sub>2</sub> concentrations 2006

Norwich Forum Roadside daily mean NO<sub>2</sub> concentrations 2006

Castle AQMA NO<sub>2</sub> diffusion tube results 2005/2006

- Castle Meadow
- Castle Meadow/Shirehall
- Upper King Street
- Cattlemarket Street

St Augustines AQMA NO<sub>2</sub> diffusion tube results 2005/2006

Monthly NO<sub>2</sub> concentrations (all locations) 2006

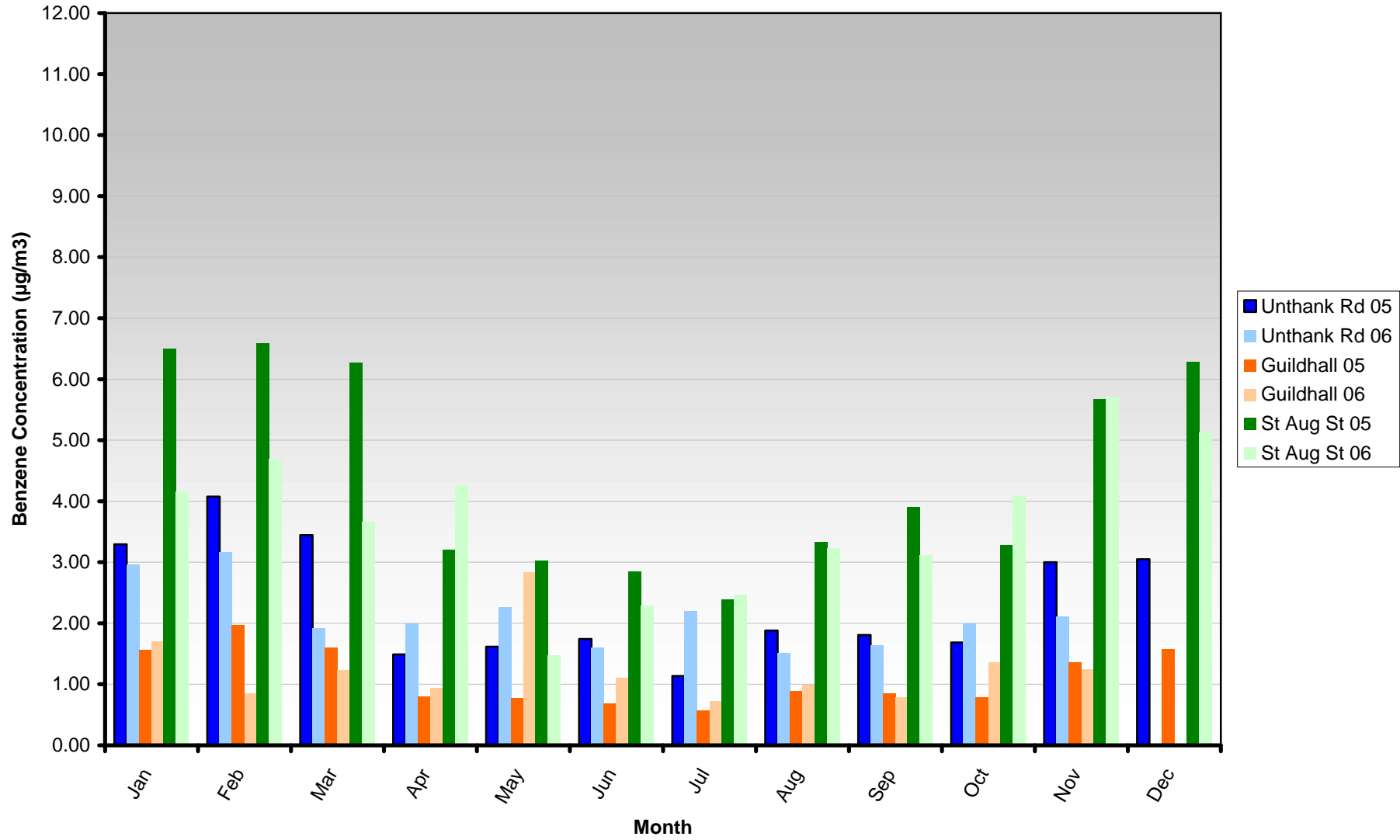
Summary NO<sub>2</sub> Diffusion Tube data 2006

Screen Shots of NETCEN precision and bias calculation spreadsheet used to calculate diffusion tube corrections

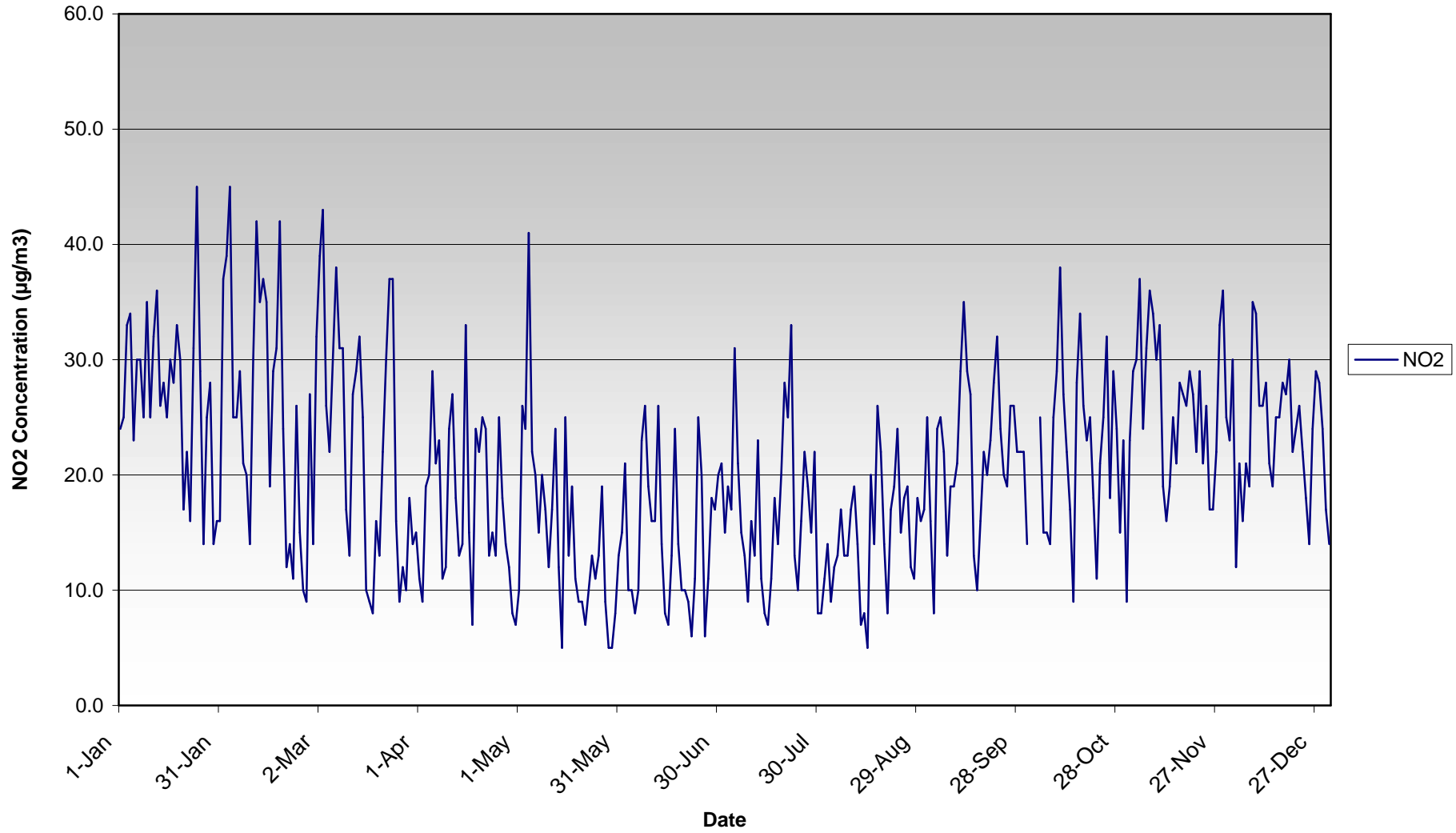
External Gamma Radiation monitoring results 2006



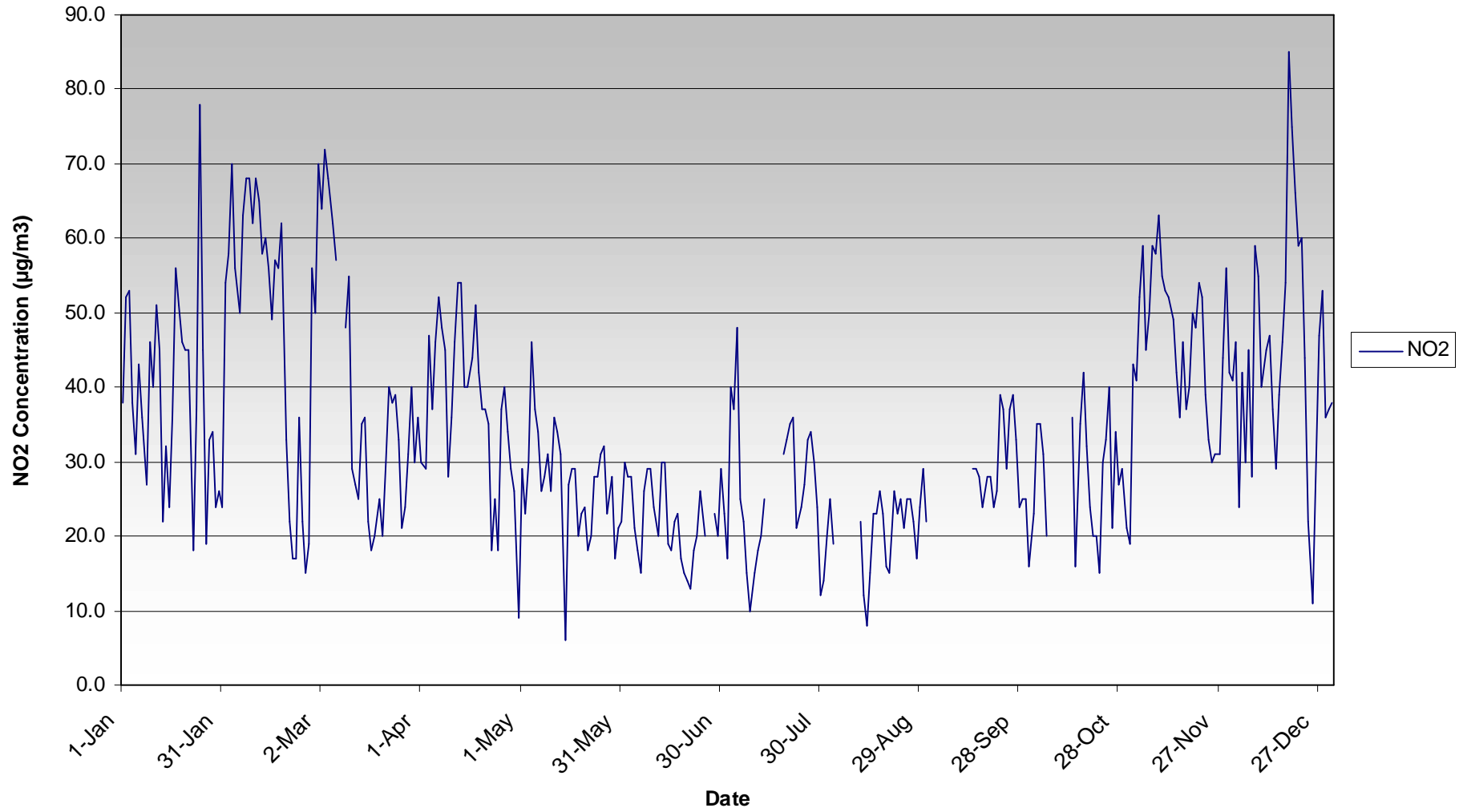
**Benzene Diffusion Tube Survey  
Monthly Averages 2005/06**



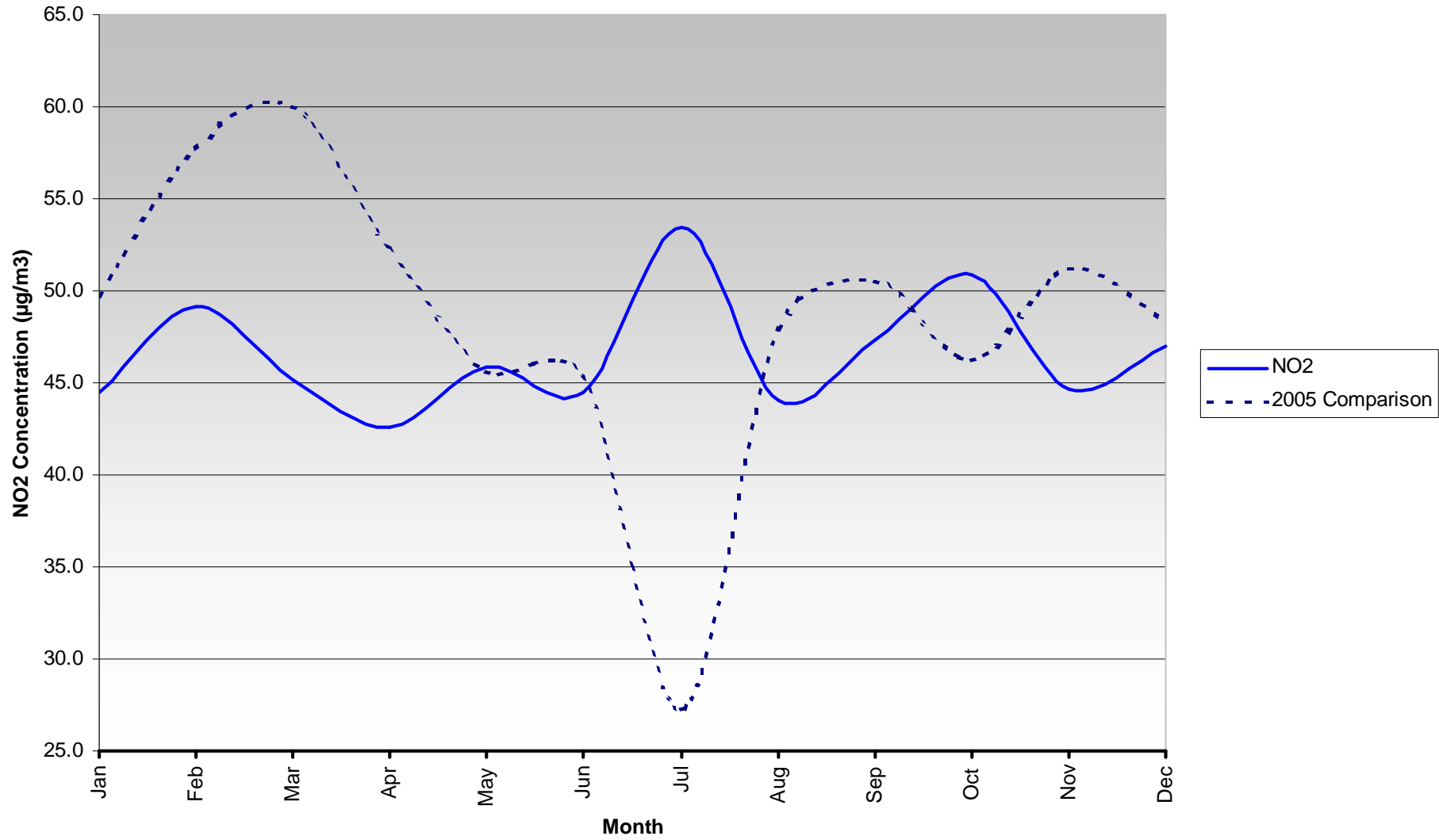
Norwich Centre  
Daily Mean Values 2006



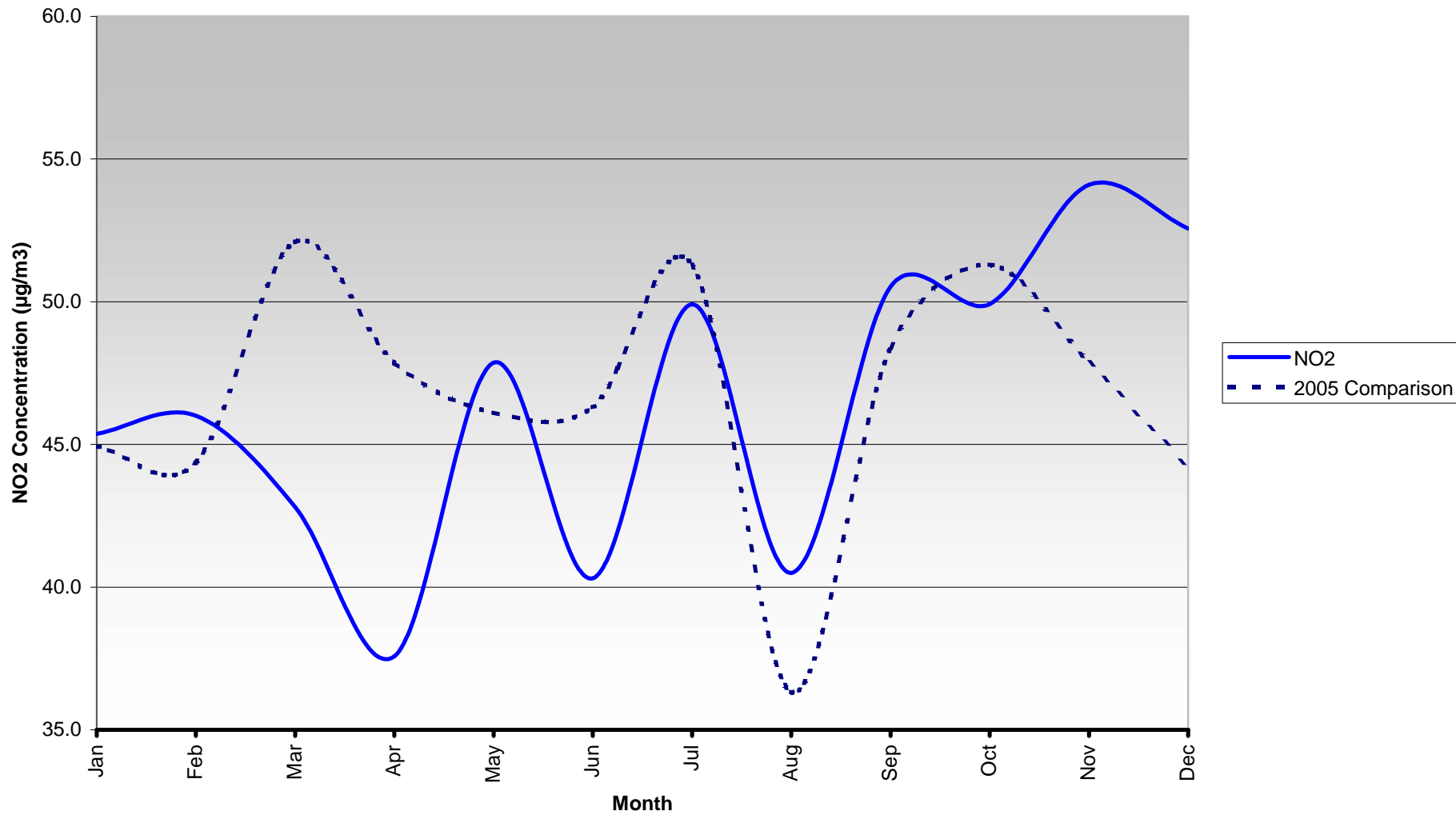
Norwich Forum Roadside  
Daily Mean Values 2006



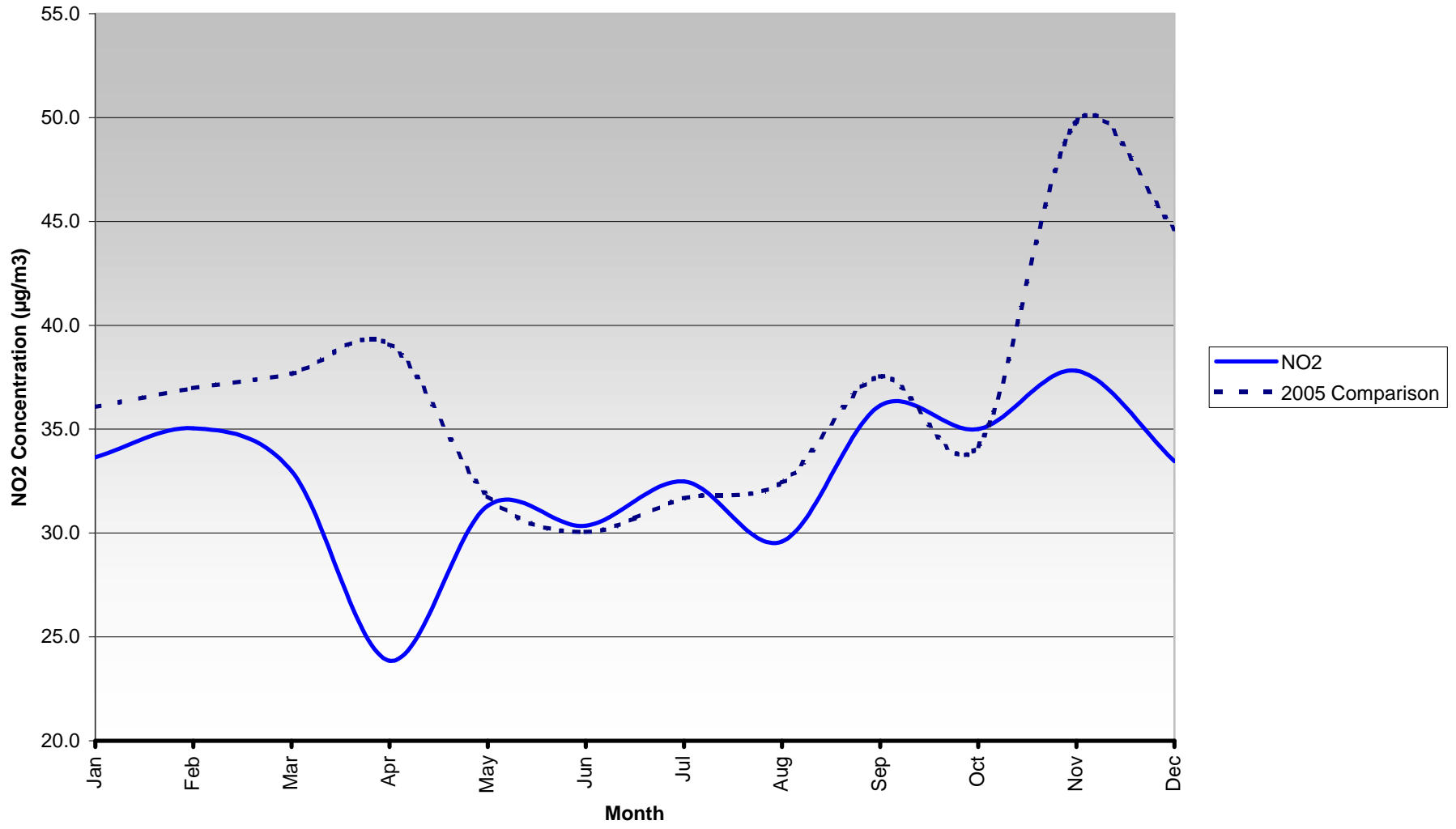
Castle AQMA  
Castle Meadow Diffusion Tube 2006



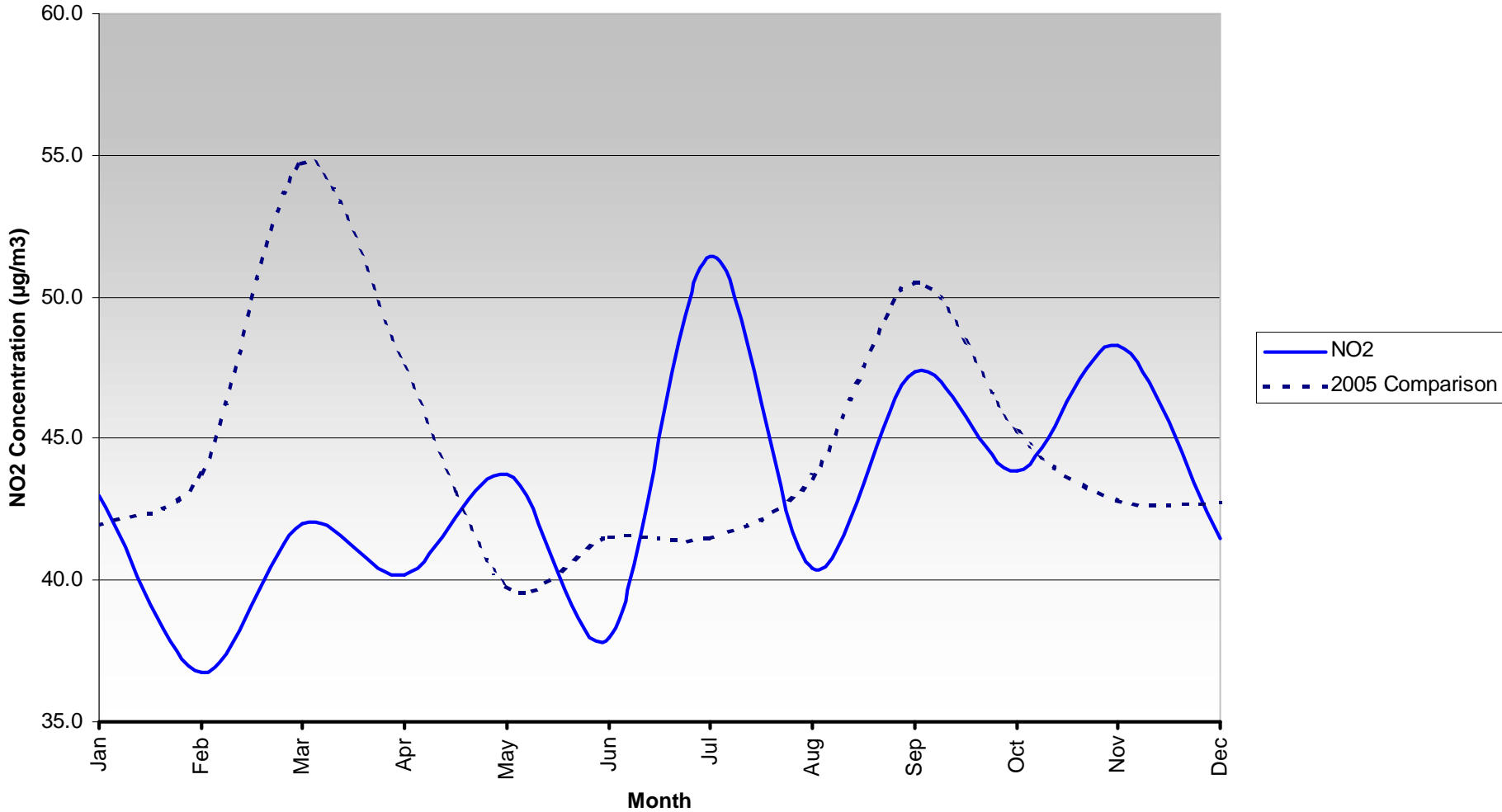
Castle AQMA  
Castle Meadow/Shirehall Diffusion Tube 2006



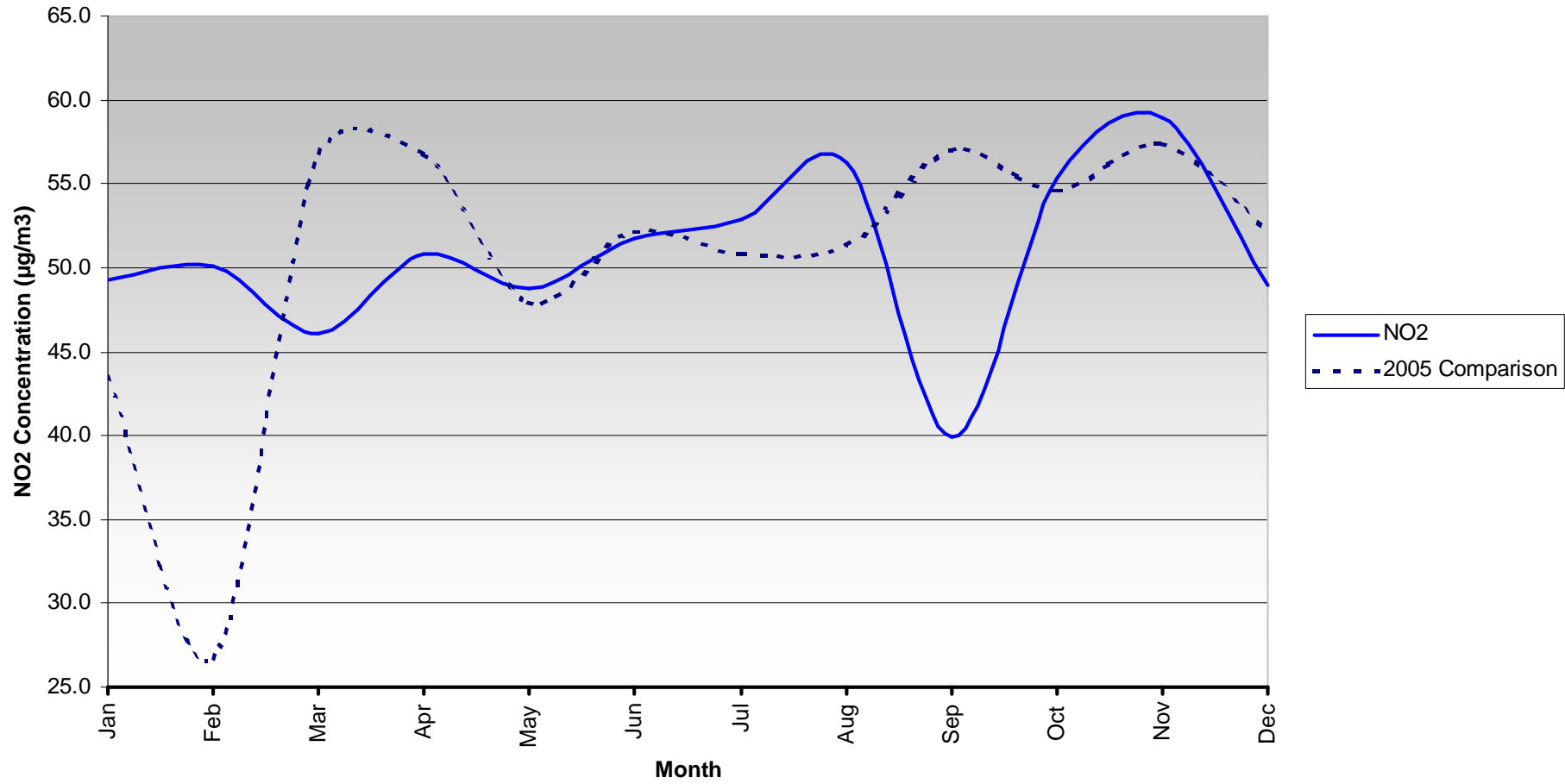
Castle AQMA  
Upper King Street Diffusion Tube 2006



Castle AQMA  
Cattle Market Street Diffusion Tube 2006



**St Augustines Street  
Diffusion Tube 2006**





## 2006 Monthly Uncorrected NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	Corrected* Annual Mean
Earlham Rd	40.2	39.3	34.0	28.7	39.0	38.5	44.7	38.4	44.0	42.3	39.7		39.0	<b>38</b>
Colman Rd	32.4	38.5	32.5	30.5	31.9	26.2	29.4	32.0	33.9	34.1	36.7		32.5	<b>32</b>
Vulcan Road	43.4	39.7	38.9	33.5	42.9	38.6	43.5	35.7	48.5	51.6	47.9		42.2	<b>41</b>
Heartsease	29.4	26.4	24.2	18.3	27.8	27.7	32.6	24.4	32.3	33.9	28.9		27.8	<b>27</b>
Tombland	39.4	40.5	39.9	38.5	43.8	40.0	44.4	55.6	48.6	46.8	51.7	20.3	42.4	<b>42</b>
Upper King St	33.6	35.0	33.0	23.9	31.3	30.4	32.5	29.6	36.1	35.0	37.8	33.5	32.6	<b>32</b>
St Vedast St	42.4	41.2	43.9	34.0	46.2	38.2	43.1	40.0	44.9	43.1	44.1		41.9	<b>41</b>
Eastbourne Pl	35.4	38.1	36.8	31.4	35.5	30.2	39.5	31.9	38.9	40.4	40.4		36.2	<b>36</b>
Riverside	45.0	47.0	48.4	36.8	47.2	48.9	56.2	50.4	48.6	50.5	52.5		48.3	<b>47</b>
Cattlemarket St	43.0	36.8	42.0	40.2	43.7	38.0	51.4	40.4	47.3	43.8	48.3	41.5	43.0	<b>42</b>
St Stephens (mid)	54.5	46.5		40.1	45.0	41.2	54.0	36.2	48.9	52.7	47.9	50.7	47.1	<b>46</b>
St Stephens	39.4	39.6	41.7	32.2	36.0	36.7	46.2	36.0	37.3	32.2	33.5		37.3	<b>37</b>
Victoria Street	36.1	45.8	34.4	26.1	30.3	29.6	36.1	30.6	33.9	32.7	34.1		33.6	<b>33</b>
Ipswich Rd	29.5	28.5	25.6	17.5	22.1	18.4	24.3	16.0	23.3	27.2	25.7		23.5	<b>23</b>
Unthank Rd	39.3	36.1	34.6	29.5	31.3	28.9	36.8	27.8	37.1	36.7	32.3		33.7	<b>33</b>
Chapelfield/Wessex St	39.3	34.0	33.6	18.9	35.9	34.7	37.8	28.8	35.3	36.5	30.3	28.4	32.8	<b>32</b>
Chapelfield/Crescent	41.9	41.0	35.6	30.9	37.9	40.9	48.6	41.6	45.9	43.5	37.1		40.4	<b>40</b>
Johnson Place	44.4	38.9	41.1	30.7	43.5	41.1	53.0	37.0	44.9	48.4	40.4		42.1	<b>41</b>
Theatre Street	39.1	36.3	39.3	28.4	28.4	24.8	31.9	30.8	33.5		34.7		32.7	<b>32</b>
Castle Meadow	44.5	49.2	45.2	42.6	45.9	44.4	53.5	44.0	47.3	50.8	44.7	47.0	46.6	<b>46</b>
Castle Meadow 2	45.4	46.0	42.8	37.6	47.9	40.3	49.9	40.5	50.5	49.9	54.1	52.6	46.5	<b>46</b>
Exchange St	41.5	36.4	35.4	25.3	33.1	33.5	42.4	69.8	59.7	44.6	47.0	46.7	42.9	<b>42</b>
St Georges St	25.7	24.2	23.6	14.5	17.6	15.4	16.8	15.7	22.0	24.4	24.8	27.2	21.0	<b>21</b>
St Augustines	49.2	50.1	46.1	50.9	48.8	51.7	52.9	56.2	40.0	55.4	59.0	49.0	50.8	<b>50</b>
Grapes Hill (lower)	36.6	34.5	38.2	20.2	27.1	26.0	33.5	21.1	31.1	32.1	24.8	28.0	29.4	<b>29</b>
Grapes Hill (upper)	31.2	26.8		19.0	23.1	20.9	25.8	17.8	30.2	31.0	28.9	30.1	25.9	<b>25</b>
Wellington La (lower)	32.9	39.6	37.8	25.6	26.7	25.8	29.5	27.2	34.0	32.0	35.7	34.4	31.8	<b>31</b>
Wellington La (upper)	36.0	38.1	33.8	28.9	32.2	33.5	31.5	33.0	38.8	37.3	37.7		34.6	<b>34</b>
Guildhall	33.6	32.5	25.2	21.8	20.7	21.0	25.3	27.8	28.1	29.5	26.4		26.5	<b>26</b>
Ber St	29.3	27.8	22.1	23.6	21.1	19.1	21.7	21.9	29.1	27.0	31.4		24.9	<b>24</b>

\*Bias adjustment factor (A) = 0.98

## Summary NO<sub>2</sub> Diffusion Tube Data 2006

Location	2006 Annual Mean (µg/m <sup>3</sup> )	Corrected Annual Mean <sup>2</sup> (µg/m <sup>3</sup> )	2010 Projected Annual Mean <sup>1</sup> (µg/m <sup>3</sup> )	Exceedance of 2005 Objective of 40 µg/m <sup>3</sup>	Exceedance of 2005 Objective in 2010?	AQMA?
Earlham Rd	39	38	33	N	N	N
Colman Rd	33	32	27	N	N	N
Vulcan Road	42	41	35	Y	N	N
Heartsease	28	27	23	N	N	N
Tombland	42	42	35	Y	N	N
Upper King St	33	32	27	N	N	Y
St Vedast St	42	41	35	Y	N	N
Eastbourne PI	36	36	30	N	N	N
Riverside	48	47	40	Y	N	N
Cattlemarket St	43	42	36	Y	N	Y
St Stephens (mid)	47	46	39	Y	N	N
St Stephens	37	37	31	N	N	N
Victoria Street	34	33	28	N	N	N
Ipswich Rd	23	23	20	N	N	N
Unthank Rd	34	33	28	N	N	N
Chapelfield/Wessex St	33	32	27	N	N	N
Chapelfield/Crescent	40	40	34	N	N	N
Johnson Place	42	41	35	Y	N	Y
Theatre Street	33	32	27	N	N	N
Castle Meadow	47	46	39	Y	N	Y
Castle Meadow 2	46	46	39	Y	N	Y
Exchange St	43	42	36	Y	N	N
St Georges St	21	21	17	N	N	N
St Augustines	51	50	42	Y	Y	Y
Grapes Hill (lower)	29	29	25	N	N	Y
Grapes Hill (upper)	26	25	22	N	N	Y
Wellington La (lower)	32	31	26	N	N	Y
Wellington La (upper)	35	34	29	N	N	Y
Guildhall	27	26	22	N	N	N
Ber St	25	24	21	N	N	N

Correction factor derived from Guidance LAQM.TG(03) Box 6.6

$$0.734 / 0.863 = 0.8505$$

# Screen Shot of NETCEN precision and bias calculation spreadsheet

Microsoft Excel - AEA\_DifTPAB\_v03.xls

File Edit View Insert Format Tools Data Window Help

Arial 18

## Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment  
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{g m}^{-3}$	Tube 2 $\mu\text{g m}^{-3}$	Tube 3 $\mu\text{g m}^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	03/01/2006	31/01/2006	25.9	25.5	25.6	26	0.2	1	0.6	27	99.7	Good	Good
2	31/01/2006	28/02/2006	25.0	24.9	22.7	24	1.3	5	3.3	26	99.6	Good	Good
3	28/02/2006	05/04/2006	24.0	23.5	23.4	24	0.3	1	0.8	22	99.1	Good	Good
4	05/04/2006	03/05/2006	14.6	14.1	14.8	15	0.3	2	0.8	18	99.9	Good	Good
5	03/05/2006	25/05/2006	16.2	19.1	17.6	18	1.5	8	3.6	16	99.8	Good	Good
6	25/05/2006	27/06/2006	15.4	15.1	15.7	15	0.3	2	0.8	14	99.7	Good	Good
7	27/06/2006	02/08/2006	16.6	16.7	17.0	17	0.2	1	0.5	17	99.5	Good	Good
8	02/08/2006	30/08/2006	15.1	15.4	16.5	16	0.8	5	1.9	15	99.7	Good	Good
9	30/08/2006	02/10/2006	21.6	22.3	22.1	22	0.3	2	0.8	21	99.4	Good	Good
10	02/10/2006	31/10/2006	24.6	24.8	23.7	24	0.6	3	1.5	23	93.1	Good	Good
11	31/10/2006	28/11/2006	24.2	24.6	25.7	25	0.8	3	2.0	25	99.7	Good	Good
12	28/11/2006	03/01/2007	27.2	27.3	27.3	27	0.1	0	0.2	24	99.7	Good	Good
13													

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

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

Site Name/ID: **Norwich Centre**

Accuracy (with 95% confidence interval)	
without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.98 (0.93 - 1.04)
Bias B	2% (-4% - 7%)
Diffusion Tubes Mean:	21 $\mu\text{g m}^{-3}$
Mean CV (Precision):	3
Automatic Mean:	21 $\mu\text{g m}^{-3}$
Data Capture for periods used:	99%
Adjusted Tubes Mean:	21 (20 - 22) $\mu\text{g m}^{-3}$

Accuracy (with 95% confidence interval)	
WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.98 (0.93 - 1.04)
Bias B	2% (-4% - 7%)
Diffusion Tubes Mean:	21 $\mu\text{g m}^{-3}$
Mean CV (Precision):	3
Automatic Mean:	21 $\mu\text{g m}^{-3}$
Data Capture for periods used:	99%
Adjusted Tubes Mean:	21 (20 - 22) $\mu\text{g m}^{-3}$

Jaume Targa  
[jaume.targa@aeat.co.uk](mailto:jaume.targa@aeat.co.uk)  
Version 03 - November 2006

Ready NUM

## Screen Shot of NETCEN precision and bias calculation spreadsheet


Microsoft Excel - AEA\_DifTPAB\_v03.xls

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C5

### Adjustment of SINGLE Tubes



From the AEA group

Diffusion Tube Measurements															
Site Name/ID	Periods													Raw Mean	Valid periods
	1	2	3	4	5	6	7	8	9	10	11	12	13		
Heartsease	29.4	26.4	24.2	18.3	27.8	27.7	32.6	24.4	32.3	33.9	28.9			27.8	11
Yulcan Road	43.4	39.7	38.9	33.5	42.9	38.6	43.5	35.7	48.5	51.6	47.9			42.2	11
Colman Road	32.4	38.5	32.5	30.5	31.9	26.2	29.4	32.0	33.9	34.1	36.7			32.5	11
Earlham Road	40.2	39.3	34.0	28.7	39.0	38.5	44.7	38.4	44.0	42.3	36.7			38.7	11
Grapes Hill - Upper	31.2	26.8		19.0	23.1	20.9	25.8	17.8	30.2	31.0	28.9	30.1		25.9	11
St Augustines	49.2	50.1	46.1	50.9	48.8	51.7	52.9	56.2	40.0	55.4	59.0	48.9		50.8	12
Tombland	39.4	40.5	39.9	38.5	43.8	40.0	44.4	55.6	48.6	46.8	51.7	20.3		42.4	12
Upper King Street	33.6	35.0	33.0	23.9	31.3	30.4	32.5	29.6	36.1	35.0	37.8	33.5		32.6	12
St Vedast Street	42.4	41.2	43.9	34.0	46.2	38.2	43.1	40.0	44.9	43.1	44.1			41.9	11
Eastbourne Place	35.4	38.1	36.8	31.4	35.5	30.2	39.5	31.9	38.9	40.4	40.4			36.2	11
Riverside	45.0	47.0	48.4	36.8	47.2	48.9	56.2	50.4	48.6	50.5	52.5	41.8		47.8	12
Cattlemarket Street	43.0	36.8	42.0	40.2	43.7	38.0	51.4	40.4	47.3	43.8	48.3	41.5		43.0	12
Ber Street	29.3	27.8	22.1	23.6	21.1	19.1	21.7	21.9	29.1	27.0	31.4			24.9	11
St Stephens Street - mid	54.5	46.5		40.1	45.0	41.2	54.0	36.2	48.9	52.7	47.9	50.7		47.1	11
St Stephens Street - top	39.4	39.6	41.7	32.2	36.0	36.7	46.2	36.0	37.3	32.2	33.5			37.3	11
Victoria Street	36.1	45.8	34.4	26.1	30.3	29.6	36.1	30.6	33.9	32.7	34.1			33.6	11
Ipswich Road	29.5	28.5	25.6	17.5	22.1	18.4	24.3	16.0	23.3	27.2	25.7			23.5	11
Unthank Road	39.3	36.1	34.6	29.5	31.3	28.9	36.8	27.8	37.1	36.7	32.3			33.7	11
Chapelfield/Wessex St	39.3	34.0	33.6	18.9	35.9	34.7	37.8	28.8	35.3	36.5	30.3	28.4		32.8	12
Chapelfield/Crescent	41.9	41.0	35.6	30.9	37.9	40.9	48.6	41.6	45.9	43.5	37.1	21.2		38.8	12
Johnson Place	44.4	38.9	41.1	30.7	43.5	41.1	53.0	37.0	44.9	48.4	40.4	27.7		40.9	12
Theatre Street	39.1	36.3	39.3	28.4	28.4	24.8	31.9	30.8	33.5		34.7			32.7	10
Castle Meadow - mid	44.5	49.2	45.2	42.6	45.9	44.4	53.5	44.0	47.3	50.8	44.7	47.0		46.6	12
Castle Meadow/Shirehall	45.4	46.0	42.8	37.6	47.9	40.3	49.9	40.5	50.5	49.9	54.1	52.6		46.5	12
Exchange Street	41.5	36.4	35.4	25.3	33.1	33.5	42.4	69.8	59.7	44.6	47.0	46.7		42.9	12

Adjusted measurement (95% confidence interval) with all the data

12 periods used in this calculations

Bias Factor A 0.98 (0.93 - 1.04)

Bias B 2% (-4% - 7%)

Tube Precision: 3 Automatic DC: 99%

Adjusted with 95% CI	27 (26 - 29)
Adjusted with 95% CI	41 (39 - 44)
Adjusted with 95% CI	32 (30 - 34)
Adjusted with 95% CI	38 (36 - 40)
Adjusted with 95% CI	25 (24 - 27)
Adjusted with 95% CI	50 (47 - 53)
Adjusted with 95% CI	42 (39 - 44)
Adjusted with 95% CI	32 (30 - 34)
Adjusted with 95% CI	41 (39 - 44)
Adjusted with 95% CI	36 (34 - 38)
Adjusted with 95% CI	47 (44 - 50)
Adjusted with 95% CI	42 (40 - 45)
Adjusted with 95% CI	24 (23 - 26)
Adjusted with 95% CI	46 (44 - 49)
Adjusted with 95% CI	37 (35 - 39)
Adjusted with 95% CI	33 (31 - 35)
Adjusted with 95% CI	23 (22 - 24)
Adjusted with 95% CI	33 (31 - 35)
Adjusted with 95% CI	32 (30 - 34)
Adjusted with 95% CI	38 (36 - 40)
Adjusted with 95% CI	40 (38 - 43)
Adjusted with 95% CI	32 (30 - 34)
Adjusted with 95% CI	46 (43 - 48)
Adjusted with 95% CI	46 (43 - 48)
Adjusted with 95% CI	42 (40 - 45)

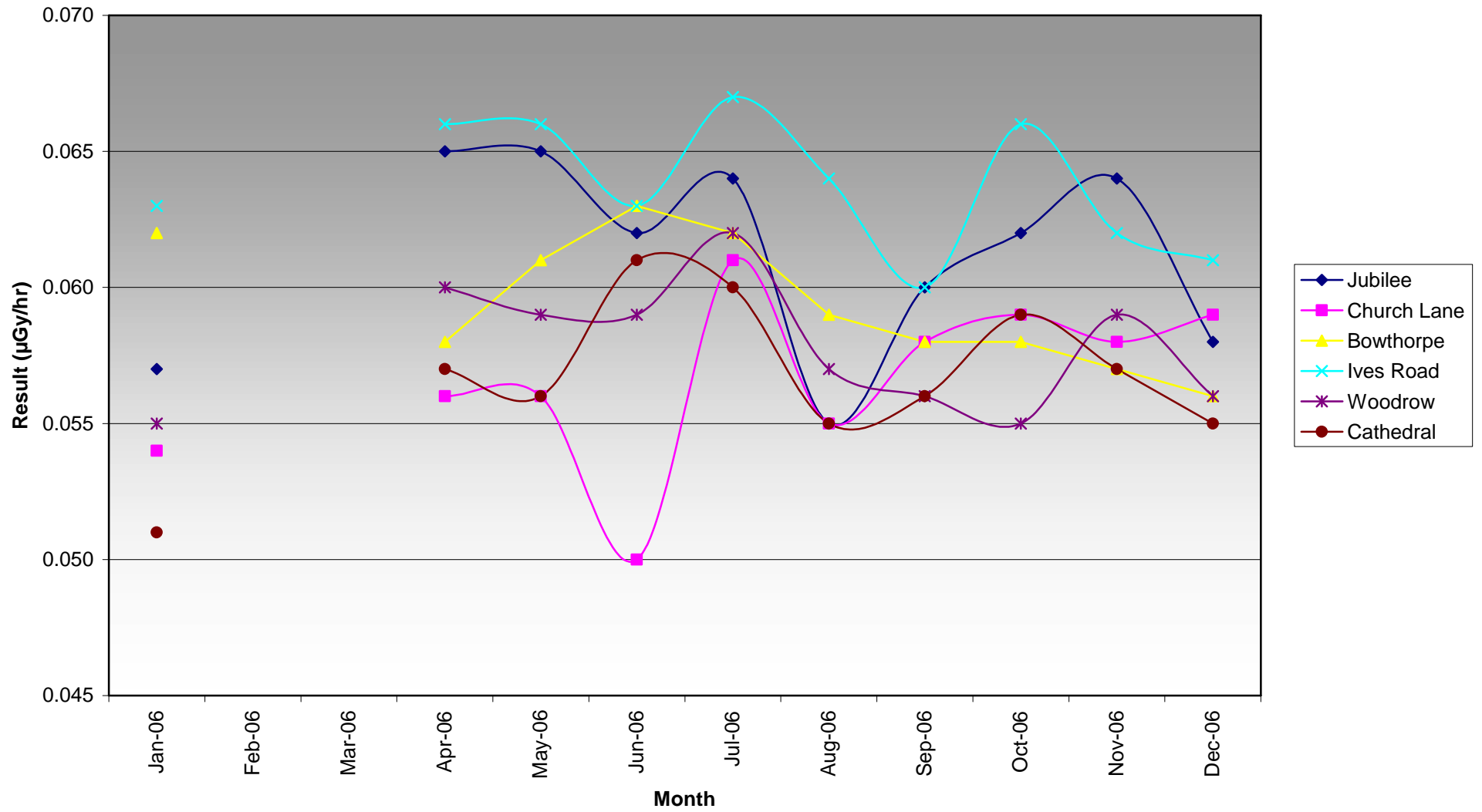
The bias adjustment factor used in these calculations include all the data and no screening of data due to poor precision has been applied.

Intro / Instructions / Precision & Accuracy / **Single Tube Adjustment** / Single Tube Adjustment (2) / Multiple Tubes Adjustment

Ready NUM



### External Gamma Radiation Monitoring Results 2006



# Appendix 3

## Action Plan Summary Table

Action plan measure	Original Timescale	Progress With Measure	Outcome to date	Comments
<b>St Augustines Street</b>				
Road Layout Changes	Design 04/05 Implementation 05/06	Design ongoing. Measure being integrated with proposals for wider regeneration of area and as part of Growth Points work. Implementation now likely to be 2008/09	Technical design established but public consultation not yet commenced	Detailed design nearing completion and planning to consult on detailed scheme by end of 2007
<b>Castle Area</b>				
Low Emission Zone	Design 04/05 Implementation 06/07 and 07/08	Project team established. Main work programme commenced at the end of August 05	European match funding has been secured through CIVITAS SMILE*. Engine switch off TRO to be implemented April 2007. Retro-fit programme commencing	Development of Quality Bus Partnerships must be underway before detailed work on LEZ can begin. Also need to reconsider funding options for retrofitting buses, as Transport Energy grant programmes have abruptly ended.
Quality Bus Partnerships & Contracts	TBA	On-going discussions between County City and First.	No outcome to date	
<b>Grapes Hill</b>				
Road Layout Changes	Design 04/05 Implementation 05/06	Layout and traffic light sequence changes completed, resulting in reduced queuing on Grapes Hill	Ambient NO2 levels consistently below objective level and 3 out of 4 tubes show reduction from 2005 to 2006	Intention is to continue monitoring for at least a further year, after which it may be possible to revoke this AQMA.

\* Visit [http://www.civitas-initiative.org/city\\_sheet.phtml?id=6&lan=en](http://www.civitas-initiative.org/city_sheet.phtml?id=6&lan=en)

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## Action Plan Summary Table

Action plan measure	Original Timescale	Progress With Measure	Outcome to date	Comments
<b>Area Wide Measures</b>				
Park and Ride and Car Parking Policy	Ongoing	All programmed Park and Ride works complete	3.727 million passengers using Park and Ride in 2005/06	6 Park and Rides sites in Norwich, with over 5,000 spaces - the most in the country
<b>Soft Measures:</b>				
Car Sharing	Ongoing	Relaunch and rebranding Autumn 2005	European match funding has been secured through CIVITAS SMILE <sup>+</sup> project	New campaign will focus on reducing single-occupancy commuter journeys and harmful emissions
Travel Wise	Ongoing	Relaunch and rebranding Autumn 2005	No outcome to date	New campaign will focus on providing better information to the public on sustainable transport options
School Travel Plans	Ongoing	Target Met	272 school travel plans agreed to date out of 485 schools in Norfolk	In March 2006 exceeded stretch target of 250 schools travel plans agreed by the end of 2006
Workplace Travel Plans	Ongoing	23 workplace travel plans agreed through section 106 agreements in period 2001-2006	No outcome to date	Integrated into CIVITAS SMILE <sup>+</sup> project
<b>Alternative Fuels:</b>				
Cleanup Motorvate Powershift	Ongoing	None (see comments)	No outcome to date	Grant programmes ended and are being revised to move to a technology neutral approach, and adjusted to comply with State Aid rules.
Bio-fuels	-	Trials commenced with bio-diesel bus and police vehicle fleets	No outcome to date	Trials being comprehensively monitored as part of CIVITAS SMILE <sup>+</sup> project
Land Use Planning	Ongoing	City of Norwich Local Plan takes an integrated approach to land use and transportation planning. Concept retained in emerging LDF	No outcome to date	
<b>Leading by Example:</b>				
Alternative Fuel Trials	2003 / 2004	Trial completed in summer 2004	County Council will use results to make better use of alternative fuels in its vehicle fleet	
Commuter Plan	Ongoing	New Travel Plan for Norwich City Council agreed 2003 and Norfolk County Council agreed summer 2004	No outcome to date	

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