CHELTENHAM BOROUGH COUNCIL

AIR QUALITY REVIEW AND ASSESSMENT

PROGRESS REPORT 2008

Part IV of the Environment Act 1995,

Local Air Quality Management

Produced with assistance from the Air Quality Management Resource Centre, University of the West of England, Bristol.

Document Control Sheet

CLIENT(S)	Cheltenham Borough Council, Gloucestershire		
UWE CONTACT	Air Quality Management Resource Centre, Faculty of Environment and Technology, University of the West of England, Frenchay Campus, Coldharbour Lane, Bristol, BS16 1QY Tel: 0117 32 83825 Fax: 0117 32 83002 Web: www.uwe.ac.uk/aqm		
COLLABORATION CONTACT	N/A		
PROJECT TEAM	Dr. Enda Hayes (UWE) (Author/Contact)		
DOCUMENT STATUS	**STATUS**	**DATE**	**DESCRIPTION**
	Draft report	May 2008	Circulated to Cheltenham for comments
	Final report	June 2008	Hardcopies (x 2) and electronic (pdf)

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1: Introduction to Local Air Quality Management Progress Reports

This Air Quality Review and Assessment Progress Report forms part of the Local Air Quality Management (LAQM) system introduced by the Environment Act 1995 ('The Act') and subsequent Regulations. It is a requirement as part of the Act, and follows on from Cheltenham Borough Council's Updating and Screening Assessment (USA) in 2006 and Progress Report in 2007. Cheltenham Borough Council's produced a Progress Report in 2004 which concluded that a Detailed Assessment would be required for nitrogen dioxide (annual mean objective at lower Bath Road). As a result of this, Cheltenham Borough Council began compiling a Detailed Assessment which will be submitted in 2008. The Updating and Screening Assessment 2006 and Progress Report 2007 concluded that a Detailed Assessment (other than the Detailed Assessment currently being compiled) would not be required; therefore this Progress Report fulfils Cheltenham Borough Council's statutory Review and Assessment requirements for 2008.

The overall aim of this document is to report upon the ongoing implementation of Local Air Quality Management in Cheltenham Borough Council, and progress made in achieving concentrations below the air quality objectives. Progress Reports have been introduced into the LAQM system following a detailed evaluation of the first round (Round 1) of local authority Review and Assessment. Progress Reports are to be prepared in years when Cheltenham Borough Council is not undertaking an Updating and Screening Assessment or a Detailed Assessment. It is intended that this Progress Report should assist Cheltenham Borough Council in the following ways:

- Maintaining a profile for LAQM within Cheltenham Borough Council;
- 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 Cheltenham Borough Council;
- Maximising the value of the investment in monitoring equipment;
- Making the next round of Review and Assessment easier, as there will be a readily available up-to-date source of information;
- Assisting Cheltenham Borough Council to respond to requests for up-to-date information on air quality;
- Providing information to assist with 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 any future Air Quality Action Plans required or Gloucestershire's County-wide Air Quality Strategy, and

- 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.

Copies of this Progress Report have been made available to the Secretary of State, Environment Agency and other neighbouring local authority departments for information as well as to the public and other local stakeholders.

1.1: Overall aims of the Progress Report

This Progress Report has two main aims, as follows:

- To report on progress being made with the implementation of Local Air Quality Management (LAQM) in Cheltenham Borough Council, and
- To report on progress in maintaining concentrations below the air quality objectives.

New monitoring data within Cheltenham Borough Council and new developments that might affect local air quality are the focus of this report, as are the minimum requirements for Review and Assessment Progress Reporting purposes. Each is considered in turn, using the Progress Report Checklist made available on the Review and Assessment website. Table 1 below provides an indication of what is expected of local authorities in their Review and Assessment Progress Report.

Table 1: Minimum Reporting Requirements

Monitoring data	The minimum requirement is to report monitoring data and trends over recent years. To maximise the value of air quality monitoring, careful attention should be paid to the type of equipment used and the locations where the monitors are placed, as well as the QA/QC and data verification procedures.
New developments	A consideration of new development with the potential to affect local air quality (mainly through the generation of traffic or the introduction of new relevant exposure in an area of existing 'poor' air quality), such as residential developments, industrial processes, retail premises, roads and quarries.

In addition to the minimum requirements, the government recommends that local authorities report upon a number of additional elements in their Review and Assessment Progress Reports. These additional elements are listed in Table 2.

Table 2: Recommended additional reporting requirements

Additional monitoring data	Projecting the measured concentrations forward to the objective years is helpful in providing early indication of likely exceedences that may not have been previously identified. Local authorities may also find it helpful to report on their monitoring for pollutants not covered by the regulations, e.g. ozone, polycyclic aromatic hydrocarbons (PAH), as well as other air quality data, i.e. odour complaints, dust deposition, radiation monitoring.
Air Quality Action Plans	Any progress on the implementation of Air Quality Action Plans where appropriate.
Local or Regional Air Quality Strategies	Government guidance strongly recommends that all authorities, particularly those without AQMAs but who have areas close to the exceedence levels, should consider drawing up a local air quality strategy. Progress Reports provide the opportunity for local authorities to report on the development of local or regional strategies. Local authorities should report upon the extent to which the local authority has developed or implemented an Air Quality Strategy, how to access the strategy and when the strategy is to next be reviewed (as appropriate).
Planning policy	Any relevant updates on planning policies that relate specifically to air quality. Policies within Local Development Frameworks (formally Local Plans) determine the local authority approach to the relationship between planning and air quality, with new developments judged against these policies. Reference to any supplementary planning guidance to address air quality matters should be referenced.
Planning applications	A list of planning applications that have the potential to affect local air quality should be provided. The land-use planning system is recognised as playing an integral part in improving air quality. This requires close co-operation between planners and Environmental Health Officers. Some local authorities have developed procedures to help ensure that planning applications that might have impacts on air quality are forwarded to the Environmental Health department for comment. Updating and Screening Assessments and Detailed Assessments should take account of planning applications that have been

	approved only. Progress Reports, however, provide the opportunity to log planning applications for new developments to give a picture of areas where changes may take place and where combined impacts from several developments may become important. The information provided should therefore include a list of any major developments under consideration that might affect air quality. Such a list could be based on those applications for which an Air Quality Assessment has been provided or for which an Air Quality Assessment has been requested.
Local Transport Plans and Strategies	Progress on implementing those elements of the Local Transport Plan (LTP) that might affect air quality should be provided. Measures to improve air quality on a local scale are closely related to the LTP. Local authorities should reference those measures within the LTP that relate specifically to bringing about air quality improvements. Local authorities should also report on any other measures aimed at addressing transport-related air quality issues that have not been (or will not be) reported in the LTP Annual Progress Report.

2: Minimum Requirements

This chapter provides the necessary information to fulfil the minimum requirements of Cheltenham Borough Council's Progress Report.

2.1: New monitoring results for Cheltenham Borough Council

This report provides a summary of all available monitoring data from 2006 in a format suitable for comparison with the relevant air quality objectives. Cheltenham Borough Council carried out real-time air quality monitoring for NO_X, NO, NO_2, SO_2, O_3 and PM_{10} (operated by Casella ETi) in 2007. The Air Quality Monitoring Site (AQMS) is located near to the town centre within 200m of roads carrying between 12,000 and 18,000 vehicles per day (some of these roads form part of the A40 between Oxford and Gloucester). The monitoring site is within a Smoke Control Area and was chosen to represent urban background pollution in Cheltenham. The main local pollution source is road traffic and there are no significant polluting sources (Part A) within 5 miles of the site. There are a number of Part B processes within the area and a hospital boiler within 0.5 km of the monitoring site.

Cheltenham Borough Council manages 21 nitrogen dioxide diffusion tube sites including a triplicate co-location study at the AQMS. The diffusion tubes used are 20% TEA in water supplied and analysed by Bristol Scientific Services. A heavy metal sampler operated by Cheltenham Borough Council at the rear of the Cheltenham Borough Council Municipal buildings was decommissioned in 2005 due to technical problems.

The following information has been included in this report:

- Map and details of the monitoring locations (Appendix 1);
- A summary table of concentrations that allow a comparison with the air quality objectives (see Table 3);
- Table 8 in Appendix 2 presents the NO_2 diffusion tube data for Cheltenham Borough Council. The 2007 annual mean has been bias adjusted (see Table 7) and projected forward to 2010 in accordance with TG(03) Box 6.6. Any locations and annual mean figures shaded red indicate an exceedence of the 40µg/m^3 annual mean NO_2 objective; and
- A plot showing trends in concentrations (Figure 2, Appendix 2).

Table 3: New monitoring results for Cheltenham Borough Council (2007)

Carbon monoxide (CO)	Cheltenham Borough Council does not carry out any carbon monoxide monitoring. The Council's 2006 Updating and Screening Assessment indicated that this was not a pollutant of concern. Cheltenham Borough Council will review this pollutant for any changes in their 2009 Updating and Screening Assessment.
Benzene	Cheltenham Borough Council does not carry out any benzene monitoring. The Council's 2006 Updating and Screening Assessment indicated that this was not a pollutant of concern. Cheltenham Borough Council will review this pollutant for any changes in their 2009 Updating and Screening Assessment.
1,3-butadiene	Cheltenham Borough Council does not carry out any 1,3-butadiene monitoring. The Council's 2006 Updating and Screening Assessment indicated that this was not a pollutant of concern. Cheltenham Borough Council will review this pollutant for any changes in their 2009 Updating and Screening Assessment.
Lead (Pb)	Cheltenham Borough Council does not carry out any lead monitoring. The Council's 2006 Updating and Screening Assessment indicated that this was not a pollutant of concern. Cheltenham Borough Council will review this pollutant for any changes in their 2009 Updating and Screening Assessment.
Nitrogen dioxide (NO_2)	Cheltenham Borough Council carries out monitoring of NO_2 using both diffusion tubes and a continuous monitor. **NO_2 Diffusion Tubes:** The diffusion tubes (20% TEA in water) are supplied and analysed by Bristol Scientific Services. The tubes at all 21 locations through out the Cheltenham Borough Council area have a monthly exposure period. A triplicate co-location study at the automatic monitoring site generated a local 2007 bias adjustment factor of 0.88 which has been applied to all nitrogen dioxide diffusion tube data. Further details of the tube locations, bias adjustment and results can be found in Appendix 1 and 2. • Study of the diffusion tube results identified four locations that will exceed the annual mean objective of 40µg/m^3. Site 1 Boots Corner (2007 annual mean concentration of 42.2µg/m^3), Site 10 Tewkesbury Road (2007 annual mean concentration of 41.1µg/m^3), Site 14 Promenade (2007 annual mean

	concentration of 44.8µg/m^3) and Site 16 lower Bath Road (2007 annual mean concentrations of 44.6µg/m^3). • Of the four sites exceeding the annual mean objective only one site, Site 16 lower Bath Road, has relevant exposure. This site is currently being assessed as part of Cheltenham Borough Councils Detailed Assessment to be submitted in 2008. **NO_2 Automatic Monitoring**: Details of the equipment, site location and the influence of local factors are described in Section 2.1 and Appendix 1. All results have been ratified and are reported to Cheltenham Borough Council by the site operators Casella ETi as quarterly reports. The calibration process is described in Appendix 3. Data capture for 2007 was 98.6%. The annual mean concentration was 23.4µg/m^3. There were no exceedences of the 1-hour mean of 200µg/m^3 objective through out 2007. Table 9 illustrates the NO_2 results from the AQMS (Appendix 3).
Particulates (PM_{10})	Cheltenham Borough Council carry out continuous Particulate PM_{10} monitoring at the AQMS described in Section 2.1. Data capture for 2007 was 97.6%. The annual mean concentration was 15.3µg/m^3. The results indicate two exceedence of the 24 hour objective. Table 10 illustrates the PM_{10} results from the AQMS (Appendix 3).
Sulphur dioxide (SO_2)	Cheltenham Borough Council carry out continuous sulphur dioxide monitoring at the AQMS described in Section 2.1. Data capture for 2007 was 98.5%. The results indicate there were no exceedences of the 15 minute, 1 hour, and 24 hour objectives. Table 11 illustrates the SO_2 results from the AQMS (Appendix 3).

2.1.1: Monitoring data summary

- Cheltenham Borough Council currently operates a real-time air quality monitoring (AQMS) for NO_X, NO, NO_2, SO_2, and PM_{10}. The AQMS monitoring data for 2007 indicates that there are no exceedences of the air quality objectives for all of the pollutants measured.
- Cheltenham Borough Council also manages 21 NO_2 diffusion tubes sites. Study of the diffusion tube results identified four locations that exceed the annual mean objective of 40µg/m^3. These are Site 1 Boots Corner (2007 annual mean concentration of 42.2µg/m^3), Site 10 Tewkesbury Road (2007 annual mean concentration of 41.1µg/m^3), Site 14 Promenade (2007 annual mean concentration of 44.8µg/m^3) and Site 16 lower Bath Road (2007 annual mean concentrations of 44.6µg/m^3). Cheltenham Borough Council is currently undertaking a Detailed Assessment for NO_2 at lower Bath Road (following on from the 2004 Progress Report). There is no relevant exposure at the three other locations therefore a Detailed Assessment is not required.
- Nitrogen dioxide concentrations for 2007 are on average approximately 7% higher than concentrations in 2006 and approximately 8% higher than concentrations in 2002. (Appendix 2, Figure 2).

2.2: New local developments

This section considers any new developments and changes that have taken place, or are proposed, that may affect air quality. Such developments are logged so that they can be considered more thoroughly during the next full round of Review and Assessment. Table 4 provides details of relevant new developments in Cheltenham Borough Council.

Table 4: New local developments with potential to affect local air quality in Cheltenham Borough Council

New Part A /A2	Cheltenham Borough Council has identified no new Part A/A2 developments
New Part B	Cheltenham Borough Council has identified no new Part B developments.
New residential development	NW Cheltenham Extension: There is a proposal currently under consideration for the development of 5000 new houses to the north-west of Cheltenham. This development will primarily impact on Tewkesbury Road, Cheltenham and also on the M5 Junction 10 AQMA declared by Tewkesbury Borough Council. Cheltenham Borough Council and Tewkesbury Borough Council are working closely together to ensure that air quality is adequately considered for this development. Cheltenham Borough Council will assess this development in more detail in their 2009 Updating and Screening Assessment. A map of the proposed development is in Appendix 4.
New retail development	Cheltenham Borough Council has identified no new retail developments that will significantly change traffic flows in the area.
New road scheme	Cheltenham Borough Council has identified no new road schemes that will significantly alter traffic flows in the area.
New mineral development	Cheltenham Borough Council has identified no new mineral developments that will significantly change traffic flows or impact on local air quality.
New landfill development	Cheltenham Borough Council has identified no new landfill sites that have been granted planning permission, and which have nearby relevant exposure.

New mixed-use development	Cheltenham Borough Council has identified no new mixed use developments that will significantly change traffic flows.

2.2.1: New development summary

The NW Cheltenham Extension is the most substantial development of concern in Cheltenham Borough Councils administrative area. Cheltenham Borough Council and Tewkesbury Borough Council are working closely together to ensure that air quality is adequately considered for this development. Cheltenham Borough Council will assess this development in more detail in their 2009 Updating and Screening Assessment.

3: Recommended additional elements

Progress made in respect of a County-wide Air Quality Strategy, Gloucestershire's Local Transport Plan and other elements are reported in Table 5 below.

Table 5: Recommended additional elements with respect to air quality progress reporting in Cheltenham Borough Council

Additional monitoring data	**Ozone monitoring:** Cheltenham Borough Council carry out Ozone monitoring at the AQMS. Results indicate that ozone concentrations measured at the AQMS in 2007 exceed the proposed ozone standard 100 µg/m³ as an 8-hour rolling average with 15 exceedences. Table 12 illustrates the ozone results from the AQMS (Appendix 3). **Other monitoring:** Cheltenham Borough Council does not carry out any other air quality monitoring.
Air Quality Action Plans	Cheltenham Borough Council was not required to develop or implement an Air Quality Action Plan following Round 1, Round 2 and Round 3 of Review and Assessment work to date.
Local or Regional Air Quality Strategies	The County-wide Gloucestershire Air Quality Strategy was adopted in 2005 and is providing an important framework for maintaining good air quality and improving upon poor air quality over the years ahead. As the pressures of large-scale developments, housing growth and road-building increases, the strategy contributes to maintaining the quality of the environment and the health and well-being of the public and communities served by the six local authorities of Gloucestershire. Community planning and sustainability planning processes underway within the Cheltenham Borough Council are taking account of local air quality, for the benefit of communities now and in the future across Gloucestershire. The main objectives of the county strategy include: • Working toward maintaining the national air quality objectives. • Continue working towards reducing ozone concentrations. • Comply with the LAQM timetable regarding the submission of reports. • Provide a framework for designating, revoking and

	amending AQMA's within Gloucester and for developing AQAP's. • Review and seek to improve the key structures and mechanisms in place regionally to deliver air quality improvements. • Ensure that air quality is a key objective in all future LTP's. • Review and reduce the main constraints to improving air quality. • Reduce air pollution inline with the underlying principles of the European Ambient Air Quality Framework Directive (96/62/EC). • Maintain good air quality and prevent the deterioration of air quality. • Reduce emissions of CO_2 emitted by road transport. • Consider subsequent reviews of the Strategy in conjunction with annual reviews of the LTP. It is expected that the Gloucestershire County-wide Air Quality Strategy will be reviewed shortly to incorporate new national and local policies and strategies such as Local Transport Plan and the revised National Air Quality Strategy 2007 etc.
Planning policy	There is no Supplementary Planning Guidance (SPG) to address air quality matters currently available to the Borough, although the authority has made use of the SPG on Planning and Air Quality produced by the Bristol, Gloucestershire and Somerset (BG&S) Environment Protection Committee in 2001.
Planning applications	There are no significant planning applications currently submitted in Cheltenham Borough Council. The council operates procedures to help ensure that planning applications that might have impacts on air quality are forwarded to the Environmental Health department for comment.
Local Transport Plan	One of the four key priorities in Gloucestershire County Council's Local Transport Plan is to improve air quality in areas where it is significantly affected by pollution from traffic. The Traffic Management Act and Gloucestershire County Council proposals to adopt ITS (mainly in the form of UTMC) and to create a traffic control centre will help reduce congestion by smoothing traffic

	flows and providing better travel information helping people to avoid congestion and encourage use of alternative modes. County wide plans are being developed to: • Promote 30 minute inter urban services to Gloucester and Cheltenham from main market towns in the county to help reduce demand on key radials, some of which run through air quality hot spots. • Promote school and business travel plans and development of Gloucestershire car share scheme. • Road safety - further 20mph schemes etc - all aimed at encouraging vulnerable modes. Plans specific to the Cheltenham Borough Council Area include: • Creation of Park and Ride at Uckington with bus priority measures on Tewkesbury Rd - provide relief on major radial into Cheltenham. • Completion of Northern Relief Rd to relieve town centre roads and enable implementation of next stages of Civic Pride which aims to remove traffic from town centre core. Improvements are already in progress for: • Traffic management on A46 Shurdington Rd (highly congested radial). • Creation of a network of ten minute turn-up-and-go bus services. Measures which have been completed include: • Expansion of Arle Court Park and Ride and introduction of further bus lanes - take pressure off A40.

4: Progress Report conclusions

- From the evidence provided in this report, an exceedence of the annual mean NO_2 objective is likely to occur at four locations (one with relevant exposure). Cheltenham Borough Council has commenced a Detailed Assessment for the location with relevant exposure. It is recommended that this Detailed Assessment be completed and submitted as soon as possible to address the findings of the 2005 and subsequent Review and Assessment reports which all identify this location as a potential problem area.
- No other exceedences of the air quality objectives for PM_{10} and sulphur dioxide have been identified.
- Fifteen exceedences were identified for the ozone air quality objective. This objective is managed at a national rather than local governance level.
- Cheltenham Borough Council will maintain a watching brief on the NW Cheltenham Extension to ensure that air quality is adequately considered.

Appendix 1: Air Quality Monitoring Locations

Figure 1: Map of air quality monitoring locations in Cheltenham Borough Council

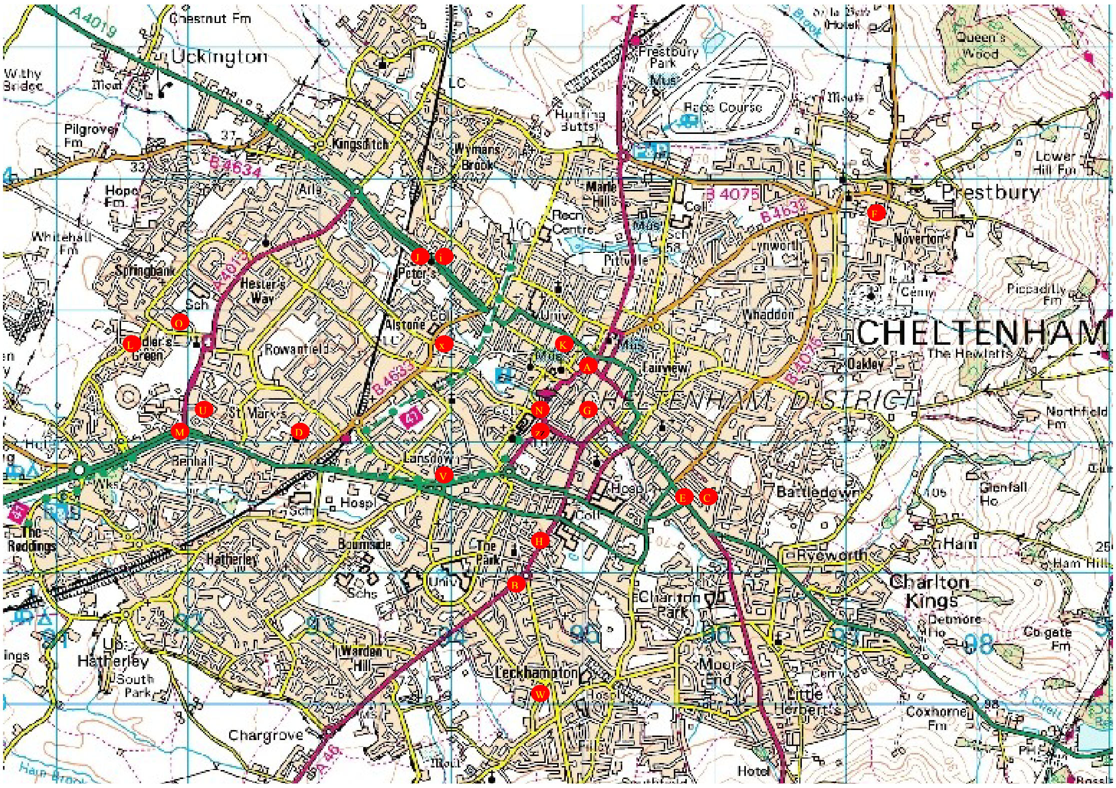


Table 6: Monitoring locations and details

Ref	Site Class	Site name	Monitor	Pollutants monitored	Grid
A	U1	Boots Corner	Diffusion tube	NO_2	394944 - 222504
B	U3	Upper Norwood St	Diffusion tube	NO_2	394483 - 220826
C	U2	212 London Road	Diffusion tube	NO_2	395964 - 221343
D	U2	Church Road P.S.	Diffusion tube	NO_2	392840 - 221878
E	U2	Chelsea Close	Diffusion tube	NO_2	395794 - 221383
F	U2	Old Bakery Prestbury	Diffusion tube	NO_2	397052 - 223882
G	U3	Cambray	Diffusion tube	NO_2	395073 - 222272
H	U1	Bath Road	Diffusion tube	NO_2	394607 - 221143
I	U2	off Tewkesbury Road	Diffusion tube	NO_2	393882 - 223436
J	U1	Tewkesbury Road	Diffusion tube	NO_2	393840 - 223415
K	U3	St Georges Street	Diffusion tube	NO_2	394706 - 222745
L	U2	Fiddlers Green Lane	Diffusion tube	NO_2	391364 - 222629
M	U2	Miserden Road	Diffusion tube	NO_2	391871 - 222037
N	U3	Promenade	Diffusion tube	NO_2	394706 - 222186
O	U2	St Aidans Close	Diffusion tube	NO_2	392072 - 222733
P	U2	lower Bath Road	Diffusion tube	NO_2	395103 - 222100
U	U2	P.E.Way	Diffusion tube	NO_2	391998 - 222163
V	U1	Westal Green	Diffusion tube	NO_2	393934 - 221603
W	U2	54 Church Road, Leckhampton	Diffusion tube	NO_2	394583 - 219723
X	U1	116 Gloucester Road	Diffusion tube	NO_2	394796 - 222592
Y	U3	Town Hall AQ Station	Continuous monitoring	NO_x, SO_2, O_3, PM_{10}	394722 - 222031
			Diffusion tubes	NO_2	

Appendix 2: Nitrogen Dioxide Diffusion Tube Data

A2.1: Calculation of the 2007 bias adjustment factor

As previously reported Cheltenham Borough Council operate a triplicate diffusion tube co-location study at its AQMS. Table 7 indicates the bias adjustment factor estimated for 2007 data. This data has also been assessed using the Precision and Accuracy Bias Tool available on the Air Quality Archive Website (http://www.airquality.co.uk/archive/laqm/tools.php).

Table 7: Diffusion tube bias adjustment 2007 (based on LAQM.TG(03))

Month	Diffusion Tube 1 ($\mu g/m^3$)	Diffusion Tube 2 ($\mu g/m^3$)	Diffusion Tube 3 ($\mu g/m^3$)	Diffusion Tube Mean ($\mu g/m^3$)	AQMS Monthly Mean* ($\mu g/m^3$)
Jan	30.9	22.8	24.9	26.2	22.2
Feb	26.9	18.9	24.2	23.3	26.0
Mar	26.5	29.7	27.3	27.8	22.5
Apr	19.9	19.6	15.6	18.4	20.0
May	16.9	18.2	16.8	17.3	23.0
Jun	32.5	31.7	32.1	32.1	19.8
Jul	18.6	16.7	16.7	17.3	14.3
Aug	21.9	21.6	22.3	21.9	16.5
Sept	22.9	23.4	23.1	23.1	18.0
Oct	33.1	32.8	31.6	32.5	30.3
Nov	41.4	37.5	39.4	39.4	35.7
Dec	40.4	41.5	41.6	41.2	32.5
Annual Mean				**26.7**	**23.4**
			Bias Adjustment Factor		**0.88**

The co-location study results have been checked for precision and accuracy to confirm the precision of the diffusion tube results, and the accuracy of the automatic monitoring results in relation to data capture. All results had good data capture and a coefficient of variation less than 20% and from these results, a bias adjustment factor of 0.88 was determined. A bias adjustment factor for 2007 was also estimated using the published Bias Adjustment Factors Spreadsheet (v04/08). A factor of 0.77 was estimated from five studies (excluding results from the Cheltenham collocation study). Although 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 uncertainty associated with this bias adjusted annual mean remains. One analysis has shown that the uncertainty for tubes bias adjusted in this way is ± 20% (at 95% confidence level). This compares with a

typical value of ± 10% for chemiluminesence monitors subject to appropriate QA/QC procedures. Having studied both scenarios regarding which factor to use it has been decided use the 'local' co-location adjustment factor of 0.88 as it is more representative of the local situation.

A2.2: Nitrogen Dioxide Diffusion Tube Data (2007)

Table 8 presents the NO_2 diffusion tube data for Cheltenham Borough Council. The 2007 annual mean has been bias adjusted and projected forward to 2010 in accordance with TG(03) Box 6.6 Pg 6-9. Any locations and annual mean figures shaded in red indicate an exceedence of the 40µg/m^3 annual mean NO_2 objective.

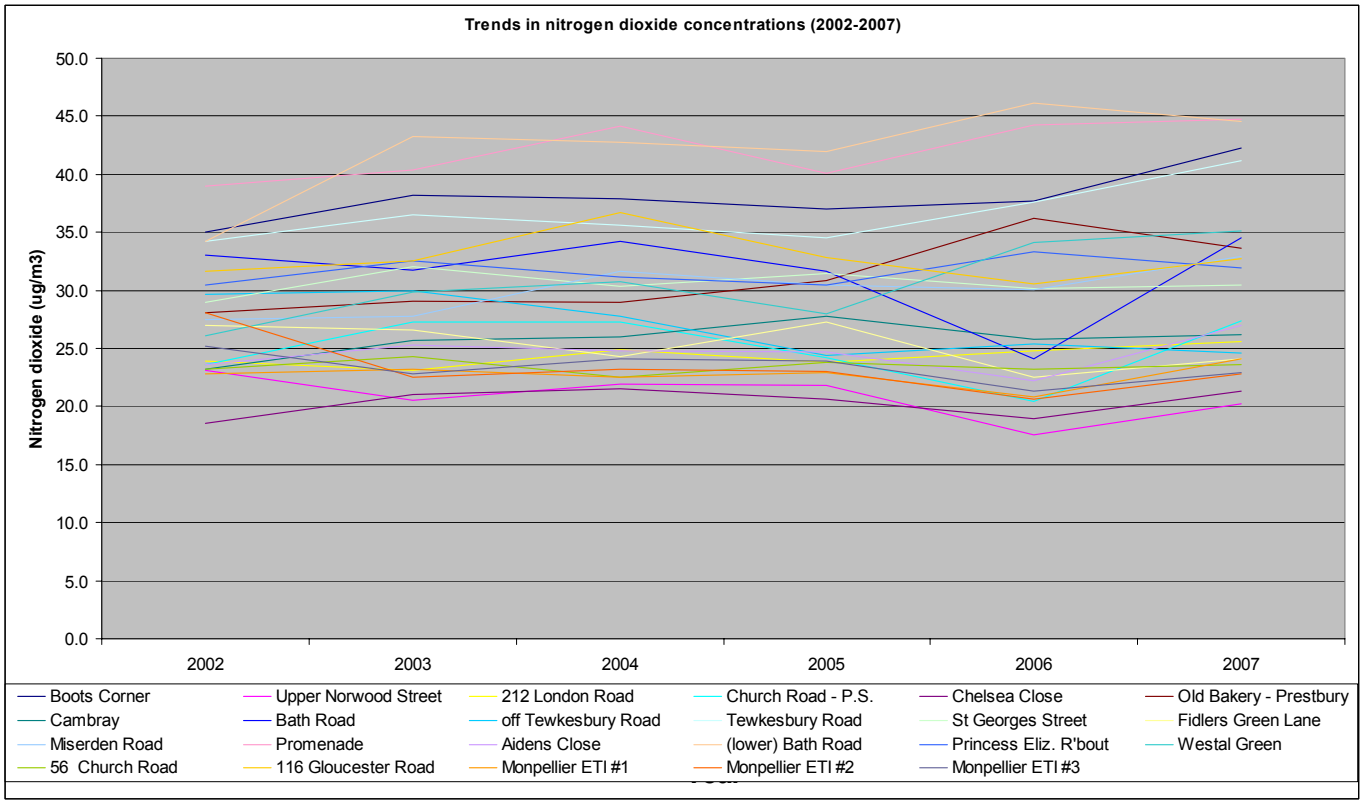
Table 8: NO_2 diffusion tube data for all locations in Cheltenham Borough Council (2007)

Site No	Tube site	Jan* µg/m³	Feb* µg/m³	Mar* µg/m³	Apr* µg/m³	May* µg/m³	Jun* µg/m³	Jul* µg/m³	Aug* µg/m³	Sept* µg/m³	Oct* µg/m³	Nov* µg/m³	Dec* µg/m³	2007# Mean µg/m³	2010# Mean µg/m³
A	**Boots Corner**	46.5	53.0	53.5	48.3	-	42.2	35.1	39.2	42.9	58.1	66.7	-	**42.2**	**37.8**
B	Upper Norwood Street	22.9	25.6	26.6	21.2	15.9	15.9	12.5	20.4	19.9	28.9	37.3	32.4	**20.3**	**18.1**
C	212 London Road	35.3	35.5	28.6	23.0	22.1	22.5	19.4	22.7	22.5	41.0	42.3	38.7	**25.6**	**22.9**
D	Church Road - P.S.	15.6	-	30.8	32.3	22.4	29.0	20.9	30.2	32.7	40.4	45.5	46.4	**27.4**	**24.5**
E	Chelsea Close	22.8	31.6	-	24.0	17.0	17.6	12.9	20.0	20.7	32.0	39.2	32.3	**21.4**	**19.1**
F	Old Bakery, Prestbury	42.6	38.8	17.6	39.5	35.4	39.0	34.9	35.3	34.3	48.7	46.9	51.2	**33.7**	**30.1**
G	Cambray	36.0	23.2	36.8	29.4	24.2	23.8	17.4	23.7	27.8	42.6	-	45.7	**26.1**	**23.4**
H	Bath Road, Leck.	41.1	46.4	42.4	37.4	37.4	38.0	26.2	36.4	40.9	45.5	-	44.6	**34.5**	**30.9**
I	off Tewkesbury Road	-	33.5	-	19.2	22.8	26.6	22.6	21.6	25.2	33.5	42.2	36.0	**24.6**	**22.0**
J	**Tewkesbury Road**	43.9	35.1	42.4	44.5	36.6	43.9	36.0	41.9	66.3	57.3	64.7	54.7	**41.1**	**36.8**
K	St Georges Street	35.8	37.8	29.7	28.4	25.9	32.8	-	26.7	32.3	46.0	-	55.1	**30.5**	**27.3**
L	Fiddlers Green Lane	24.9	19.8	27.1	-	19.1	23.2	22.0	24.6	29.5	37.7	40.6	36.7	**24.1**	**21.6**
M	Miserden Road	36.8	39.1	36.1	39.3	24.8	29.6	29.1	32.4	41.8	41.8	57.0	45.9	**32.9**	**29.4**
N	**Promenade**	49.1	52.9	46.7	42.6	44.4	49.9	44.7	49.8	52.6	59.8	67.6	57.2	**44.8**	**40.0**
O	St Aidens Close	26.0	37.9	28.9	30.2	-	22.0	15.8	24.4	-	41.2	41.9	42.2	**27.0**	**24.2**
P	**6 lower Bath Road**	43.9	54.0	40.1	64.6	37.6	52.8	43.3	43.6	50.4	63.6	61.4	59.6	**44.6**	**39.9**
U	Princess Eliz. R'bout	35.0	42.7	35.2	38.5	26.3	32.8	27.9	31.0	36.6	42.0	51.0	42.1	**32.0**	**28.6**
V	Westal Green	36.9	46.6	40.9	39.7	29.2	34.6	30.7	31.9	42.4	47.2	50.4	54.4	**35.2**	**31.5**
W	56 Church Road, Leck.	26.8	21.8	29.8	27.4	20.4	24.4	17.7	20.5	26.7	36.8	36.4	37.6	**23.7**	**21.2**
X	116 Gloucester Road	36.2	37.9	33.7	43.9	21.9	39.5	28.4	30.7	33.0	49.9	49.2	47.9	**32.8**	**29.3**
Y	Monpellier ETI #1	30.9	26.9	26.5	19.9	16.9	32.5	18.6	21.9	22.9	33.1	41.4	40.4	**24.1**	**21.5**
Y	Monpellier ETI #2	22.8	18.9	29.7	19.6	18.2	31.7	16.7	21.6	23.4	32.8	37.5	41.5	**22.8**	**20.4**
Y	Monpellier ETI #3	24.9	24.2	27.3	15.6	16.8	32.1	16.7	22.3	23.1	31.6	39.4	41.6	**22.9**	**20.5**

* Data in these columns are not bias adjusted # Data in these columns are bias adjusted

A2.3: Assessment of air quality trends

Figure 2: Comparison of annual mean nitrogen dioxide concentrations for a select number of locations (2002 - 2007)



Nitrogen dioxide concentrations for 2007 are on average approximately 7% higher than concentrations in 2006 and approximately 8% higher than concentrations in 2002. The site with the largest increase in concentrations since 2006 was Bath Road (increase of 30%), conversely, the site with the greatest decrease in concentrations since 2006 was Old Bakery Presbury (decrease of 8%). In the longer term, the site with the largest increase in concentrations since 2002 was Westal Green (increase of 35%), conversely, the site with the greatest decrease in concentrations since 2002 was off Tewkesbury Road (decrease of 17%).

Appendix 3: AQMS data from Cheltenham Borough Council

Table 9: NO_2 monitoring data from Cheltenham Borough Council AQMS (Monitor Labs ML9841B Chemiluminescent Analyser)

Month (2007)	NO_2 monthly mean ($\mu g/m^3$)	Exceedences of the 1-hr mean (200 $\mu g/m^3$)	Data Capture (%)
January	22.2	0	88.7
February	26.0	0	100
March	22.5	0	99.9
April	20.0	0	1000
May	23.0	0	99.2
June	19.8	0	97.1
July	14.3	0	99.8
August	16.5	0	99.6
September	18.0	0	100
October	30.3	0	99.5
November	35.7	0	99.9
December	32.5	0	99.3
Mean	**23.4**	**0**	**98.6**

A3.1: Calibration process for nitrogen oxides analyser

The AQMS at Cheltenham uses the daily automatic calibration checks. To validate the data, an automatic daily calibration check is conducted to verify the response of the analyser in reference to the 'zero' and 'span' by introducing a high known concentration of NO gas. The daily calibration check produces an actual zero and actual span response value which is stored on a calibration file on the logger. The calibration results are then used to create a calibration factor, which is used to rescale the data.

Table 10: PM_{10} monitoring data from Cheltenham Borough Council AQMS.
(TEOM – results have been adjusted by a factor of 1.3)

Month (2007)	PM_{10} monthly mean ($\mu g/m^3$)	Exceedences of the 24-hr mean (50 $\mu g/m^3$)	Data Capture (%)
January	11.1	0	87.1
February	17.9	0	100
March	19.4	1	100
April	20.0	0	100
May	13.8	0	100
June	15.5	0	96.7
July	11.4	0	100
August	13.1	0	100
September	13.7	0	100
October	15.6	0	87.1
November	16.3	1	100
December	16.2	0	100
Mean	**15.3**	**2**	**97.6**

Table 11: SO_2 monitoring data from Cheltenham Borough Council AQMS
(Monitor Labs ML9850B UV Flourescence Analyser)

Month (2007)	SO_2 Monthly Mean	Exceedences of 15-min, 1-hr and 24-hr objectives			Data Capture
	($\mu g/m^3$)	15-min	1-hr	24-hr	(%)
January	3.5	0	0	0	88.7
February	5.0	0	0	0	100
March	3.5	0	0	0	99.5
April	4.3	0	0	0	100
May	3.4	0	0	0	98.1
June	5.6	0	0	0	97.2
July	3.7	0	0	0	100
August	4.2	0	0	0	98.9
September	3.1	0	0	0	100
October	3.8	0	0	0	99.6
November	3.6	0	0	0	100
December	5.0	0	0	0	100
Mean	**4.1**	**0**	**0**	**0**	**98.5**

Table 12: O_3 monitoring data from Cheltenham Borough Council AQMS (Monitor Labs ML9810B Ozone Analyser)

Month (2007)	O_3 monthly mean ($\mu g/m^3$)	Exceedences of the 8-hr mean (100 $\mu g/m^3$)	Data Capture (%)
January	55	0	88.2
February	40	0	100
March	59	2	100
April	70	10	100
May	56	2	98.9
June	43	0	98.9
July	36	0	100
August	37	1	98.9
September	35	0	100
October	30	0	98.9
November	31	0	100
December	37	0	100
Mean	**44.1**	**15**	**98.7**

Appendix 4: Map of proposed NW Cheltenham Extension area

Figure 3: Map of NW Cheltenham Extension