2010 Air Quality Progress Report for **Gloucester City Council**

In fulfillment of Part IV of the Environment Act 1995
Local Air Quality Management

April 2010

A Report to DEFRA and Gloucester City Council

This report uses a template provided by DEFRA and thus does not follow City Council design standards

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Executive Summary

This is the latest in an annual series of reports under the Local Air Quality regime of the Environment Act 1995. The previous reports are summarised in section 1.4. All are available online at www.gloucester.gov.uk/pollution by following the “air quality” links. As a result of these reports the city currently has three Air Quality Management Areas (AQMAs) in Priory Road, Barton Street and Painswick Road. Maps are shown at Fig 1.1b-d. **The latest monitoring confirms the need to maintain these AQMAs**.

The last Updating and Screening Assessment (2009) showed that a detailed assessment is required for fine particles at the housing near Myers Road. This detailed assessment has been delayed due to difficulty in identifying both funding and a suitable location to monitor, and will thus form a separate report. The study is just commencing.

The last Updating and Screening Assessment also showed a need for a detailed assessment for nitrogen dioxide at a location on Barnwood Road, a short length of houses between Elmbridge Road and the Cross Keys public house. This assessment has been carried out and **is included in this report**. It shows that **a new Air Quality Management Area is required at this location,** shown in Fig 1.1a.

The current report does not show the need for any further detailed assessments or for any changes to the existing AQMAs.

Table of contents

Appendices

List of Tables

List of Figures

1 Introduction

1.1 Description of Local Authority Area

Gloucester is a small city (population 110,000) on the left bank of the tidal River Severn, backed by the Cotswold escarpment. The prevailing airflow is from the southwest up the river, channelled by the hills in the distance to either side. The M5 motorway edge forms the eastern boundary, and thus airflows are mainly from the city towards the motorway. The air quality at the two sites adjacent to the motorway (regularly monitored for nitrogen dioxide) is thus generally good. The city is unusual in being a compact area surrounded by farmland, which is mostly in neighbouring districts. It does therefore suffer from farming odours at certain times of the year.

A large waste disposal site occupies the northwest part of the city, which benefits from a comprehensive Permit to Operate issued by the Environment Agency. As a result it operates to a high standard, which has not always been the case. There are several Part A1 industrial processes in the city, mainly due to discharges to sewer, and thus of little concern here. There is one Part A2 installation, an aluminium scrap melter. There are 41 installations permitted under Part B, including petrol stations, vehicle refinishers, coating plant, dry cleaners, timber yards, none of which are significant polluters.

1.2 Purpose of Progress Report

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to Local Air Quality Management (LAQM) **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), and the Air Quality (England) (Amendment) Regulations 2002 (SI 3043). They are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre $\mu g/m^3$ (for carbon monoxide the units used are milligrammes per cubic metre, mg/m^3). Table 1.1. includes the number of permitted exceedences in any given year (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.

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

1.4 Summary of Previous Review and Assessments

All reports post 2003 are available at www.gloucester.gov.uk/pollution following the *Air Quality* link. For simplicity only locations of concern are mentioned below. The actual reports should be examined for other areas studied at various times.

Assessments before 2000 showed that there were no areas of concern in the City. However the Updating and Screening Assessment for 2002 (published May 2003) restudied many areas of the city and showed that there were five areas of potential concern. The Detailed Assessment of these areas published in 2004 showed:

Millbrook Road – No further concern for benzene

Priory Road – An AQMA is required for nitrogen dioxide (declared in Aug 2005)

Barton Street – An AQMA is required for nitrogen dioxide (declared in 2005)

Eastern Avenue/Painswick Road (North) no current concern for PM10 and nitrogen dioxide

Barnwood Road/ Elmbridge Road junction no current concern for PM10 and nitrogen dioxide

The Updating and Screening assessment for 2005 (published May 2006) again showed a detailed assessment was required for nitrogen dioxide for the short section of Painswick road mentioned above. The detailed assessment (published March 2007) showed that an AQMA was required for this area (declared Oct 2007). This report also again required a detailed assessment for nitrogen dioxide for the Barnwood Road junction mentioned above. The detailed assessment published in March 2008 showed that an AQMA was not required at that time.

The Updating and Screening Assessment for 2008 published May 2009 showed that a detailed assessment was again required for nitrogen dioxide for the Barnwood Road/ Elmbridge Road junction. **This current report shows that an Air Quality Management Area should now be declared**. As usual local consultation will take place before the boundaries are declared.

The Updating and Screening Assessment published May 2009 also showed that a detailed assessment should be made for fine particles (PM_{10}) for the housing within 200m of Myers Road, due to the probability of resuspended dust from this haul road used by skip lorries, sand and gravel lorries and cement lorries. Progress on this activity has been delayed due to lack of an obvious funding source and difficulty in determining a reliable sampling location. Funding has now been found for a minimum three month period, and a location in a relevant garden, where power can be obtained from a lamp post. It is proposed to install a BAM-1020 continuous Particulate monitor with data collection using GSM.

Figure 1.1 Map of AQMA Boundaries

Four Maps are given for the three existing AQMAs and the proposed new AQMA on Barnwood Road on the next two pages. The key map Fig 2.2 shows their positions in the city, and approximate position of sampling points across the city.

Fig 1.1a Proposed Barnwood Road AQMA (Subject to consultation)

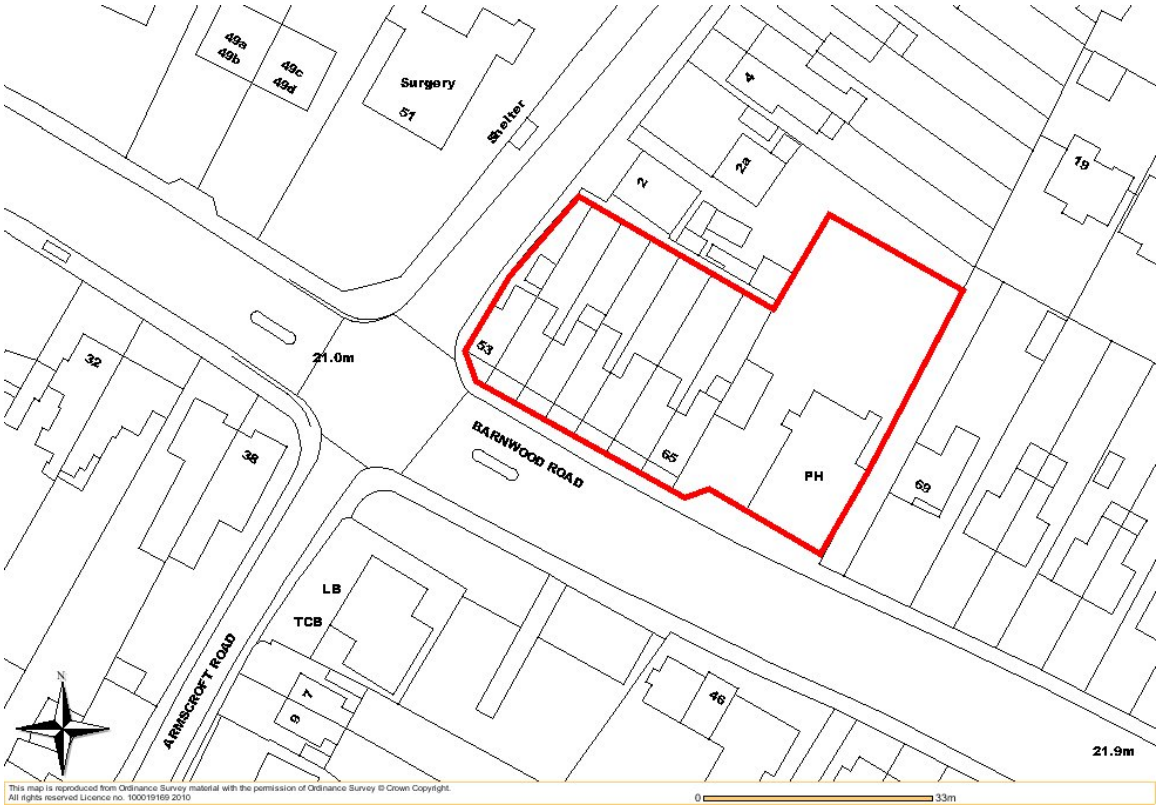


Fig 1.1b Barton Street AQMA

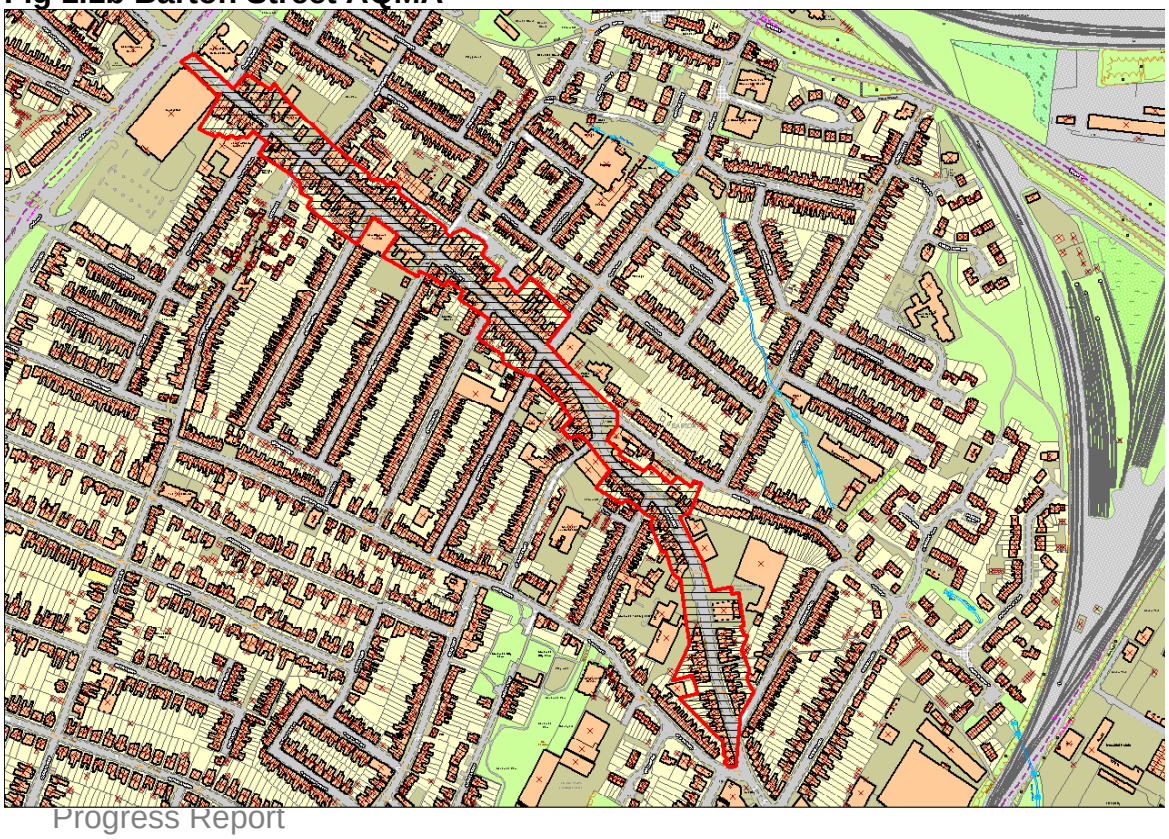


Fig 1.1c Priory Road AQMA

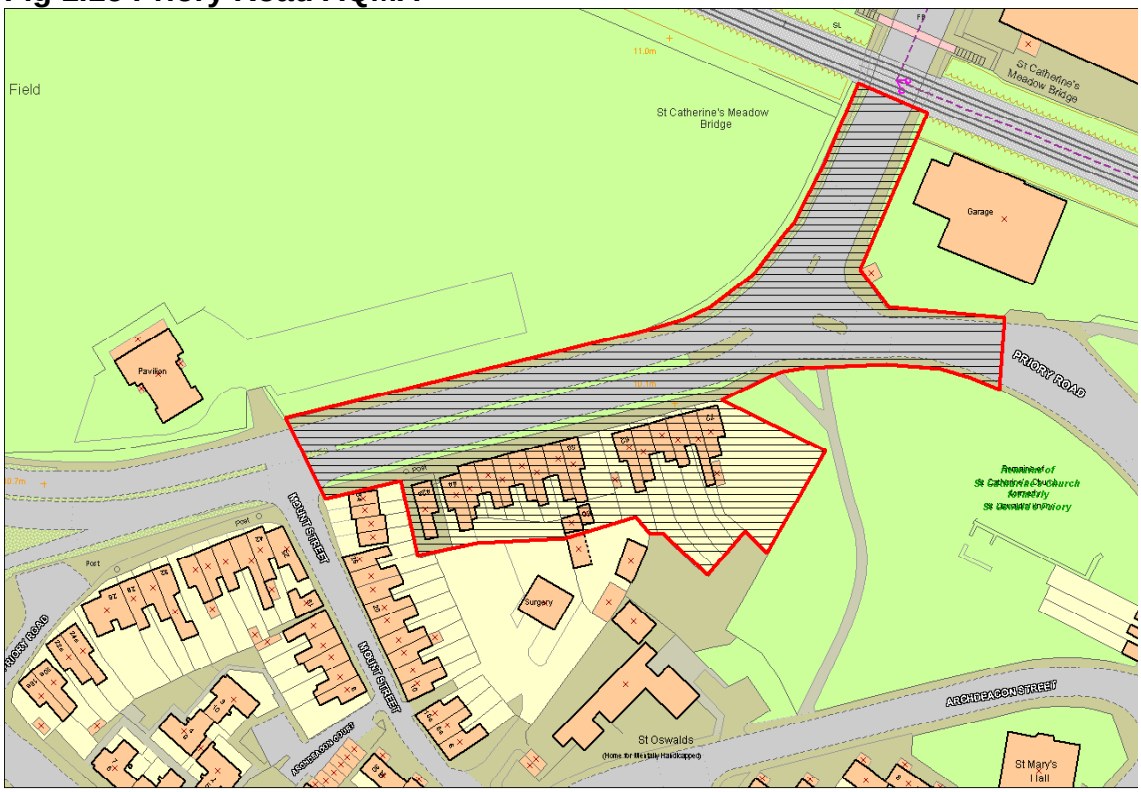
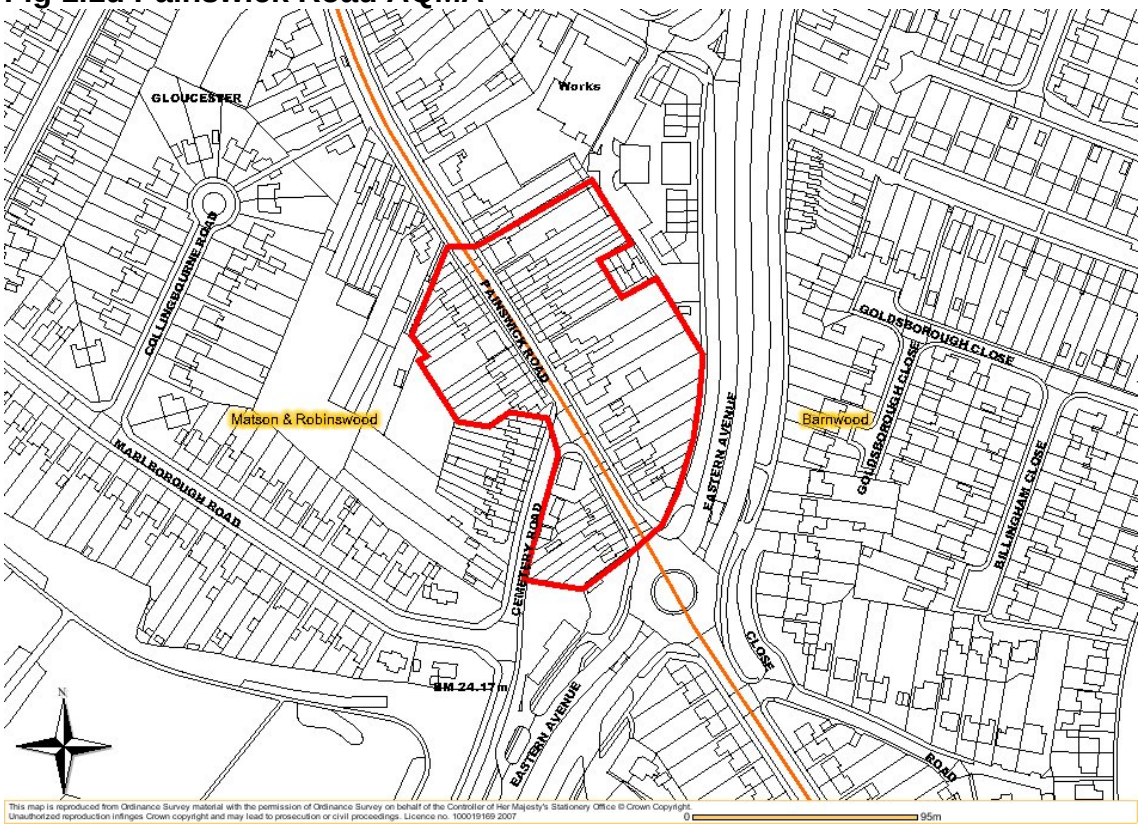


Fig 1.1d Painswick Road AQMA



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

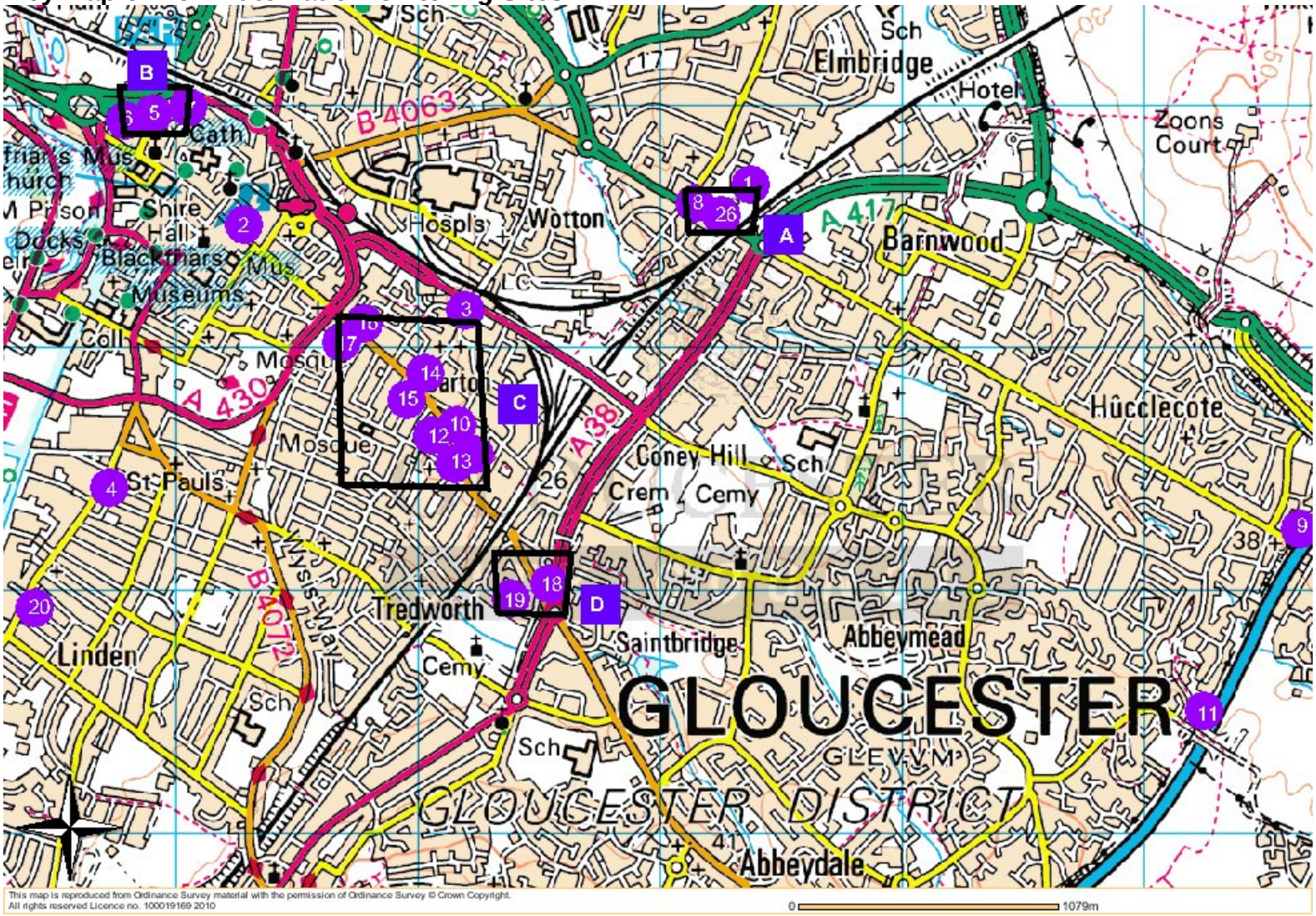
2.1.1 Automatic Monitoring Sites

No automatic monitoring sites were in use during the period of this report. The County Council has installed a nitrogen dioxide chemiluminescence station at the end of Barton Street adjacent to the inner ring road. It is not yet running under appropriate quality controls, though it is hoped this will be achieved during the coming year. This site is an experimental attempt to control traffic lights during high pollution incidents, as an attempt to reduce pollution in the Barton Street AQMA.

2.1.2 Non-Automatic Monitoring

A map of the city showing the approximate positions of sampling points and the AQMAs is given in figure 2.2. A table of the sampling point details is given below in Table 2.2. Information about quality assurance of the results is given in Appendix 1 and detailed monthly results are given in tables in Appendix 2. Annual average results are given in table 2.4, showing the last three years. Trend graphs for several years where more data is available are given in Fig 2.4 The results are discussed in section 10.1

Figure 2.2 Key Map of Non-Automatic Monitoring Sites



A = proposed AQMA in Barnwood Rd; B = Priory Rd AQMA C = Barton St AQMA; D = Painswick Road AQMA

(See individual maps for actual extent of each AQMA)

Table 2.2 Details of Non- Automatic Monitoring Sites

Site Name	ID	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location ?
Guildhall	1	Urban background	X 383243 Y 218489	Benzene, NO_2	N	N	NA	N
Elmbridge Junior School	2	Urban background	X 385430 Y 218870	Benzene, NO_2	N	Y 1m	NA	N
79 Millbrook Street	3	Roadside	X 384190 Y 218160	Benzene, NO_2	N	Y <1M	1.0	Y
61 Bristol Rd	4	Roadside	X 382690 Y 217440	Benzene ,NO_2	N	N	2.2	Y
59 Bristol Rd (façade)	5	Background	X 382690 Y 217440	NO2	N	Y 1m		Y
157 Bristol Rd	6	Roadside	X 382410 Y 217013	NO_2	N	Y 1m	6.5	Y
35 Buscombe Gardens	7	Background	X 387670 Y 217250	NO_2	N	Y <1m	NA	N
12 Caravan Green Lane	8	Backgorund	X 387250 Y 216530	NO_2	N	Y <1m	NA	N
46 Priory Road	9	Roadside	X 382898 Y 219029	NO_2	Y	Y <1m	5.0	Y
56 Priory Road	10	Roadside	X 382921 Y 219034	NO_2	Y	Y <1m	5.0	Y
66 Priory Road	11	Roadside	X 382950 Y 219040	NO_2	Y	Y <1m	6.0	Y
Rear 58 Priory Road	12	Background	X 382929 Y 219019	NO_2	Y	Y 1m	NA	N
St Oswalds Rd Wessex Gge	13	Roadside	X 383033 Y 219168	NO2	N	N	0	Y
St Oswalds Rd VW garage	14	Roadside	X 38300 Y 219090	NO2	Y	N	0	Y
99 Barton Street	15	Roadside	X 383717 Y 218094	NO_2	Y	Y 1m	1.4	Y
124 Barton Street	16	Roadside	X 383726 Y 218074	NO_2	Y	Y 1m	1.5	Y
196 Barton Street	17	Roadside	X 383989 Y 217857	NO_2	Y	Y 1m	2.0	Y
219A Barton St	18	Roadside	X 384000 Y 217863	NO_2	Y	Y 1M	1.7	Y
End Vauxhall Terrace	19	Background	X 383860 Y 218010	NO_2	y	Y 1m	NA	N
246 Barton Street	20	Roadside	X 384081 Y 217725	NO_2	Y	Y <1m	1.5	Y
Opp 248 Barton St	21	Roadside	X 384090 Y 217731	NO_2	Y	Y <1m	2.5	Y
316 Barton street	22	Roadside	X 384175 Y 217501	NO_2	Y	Y <1m	2.4	Y
301 Barton St	23	Roadside	X 384182 Y 217533	NO_2	Y	Y 1m	4.8	Y
65 Painswick Rd	24	Roadside	X 384512 Y 217023	NO_2	N	Y 1m	5.4	Y
76 Painswick	25	Roadside	X 384490 Y 217027	NO_2	N	Y 1m	3.7	Y
88 Painswick Road	26	Roadside	X 384509 Y 216998	NO_2	Y	Y 1m	3.8	Y
97 Painswick Road	27	Roadside	X 384558 Y 216946	NO_2	Y	Y 1M	5.1	Y
106 Painswick Road	28	Roadside	X 384550 Y 216932	NO_2	Y	Y 1m	3.5	Y
53 Barnwood Road	29	Roadside	X 385113 Y 218595	NO_2	N	Y <1m	1.5	Y
61 Barnwood Road	28	Roadside	X 385130 Y 218585	NO_2	N	Y 1m	4.6	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide

Charts are presented for the four areas of concern separately. All have the two local background site (Guildhall and Elmbridge) results for comparison. Note 40ug/m3 nitrogen dioxide represents the annual target that should not be exceeded. Results over 60 ug/m3 represent a risk of exceeding the 1 hour standard. No levels over 60 ug/m3 were recorded except at the roadside locations under the St Catherines Railway Bridge, where there are no relevant receptors. The tabular data is then presented in Table 2.2. Detailed monthly data is presented in the appendices. The results are discussed at 10.1

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites.

Fig 2.4a The proposed Barnwood Road AQMA

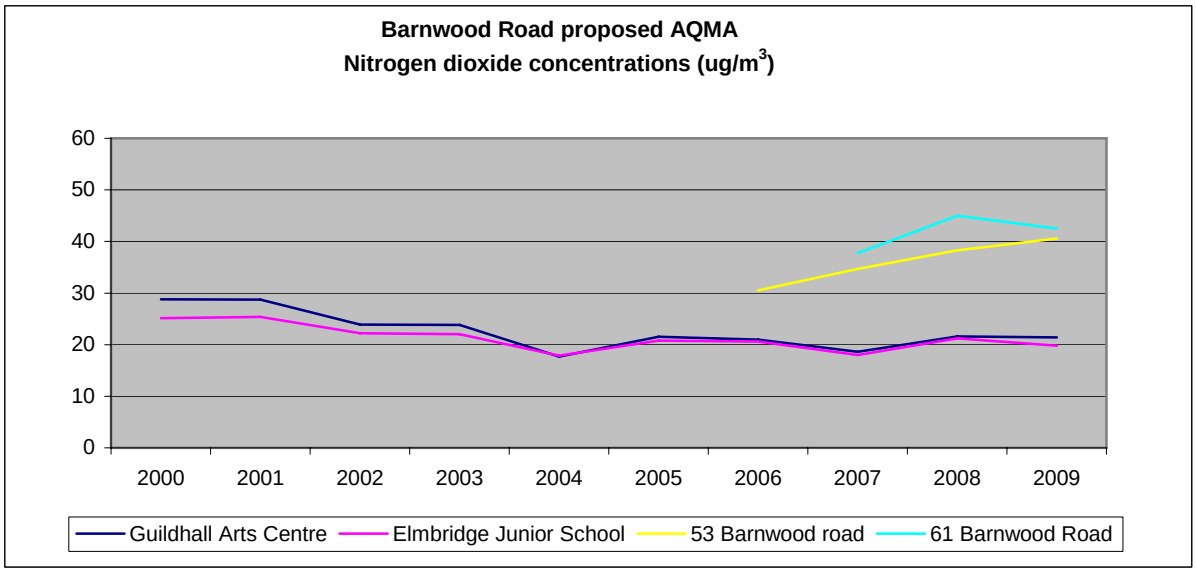


Fig 2.4b Barton Street AQMA

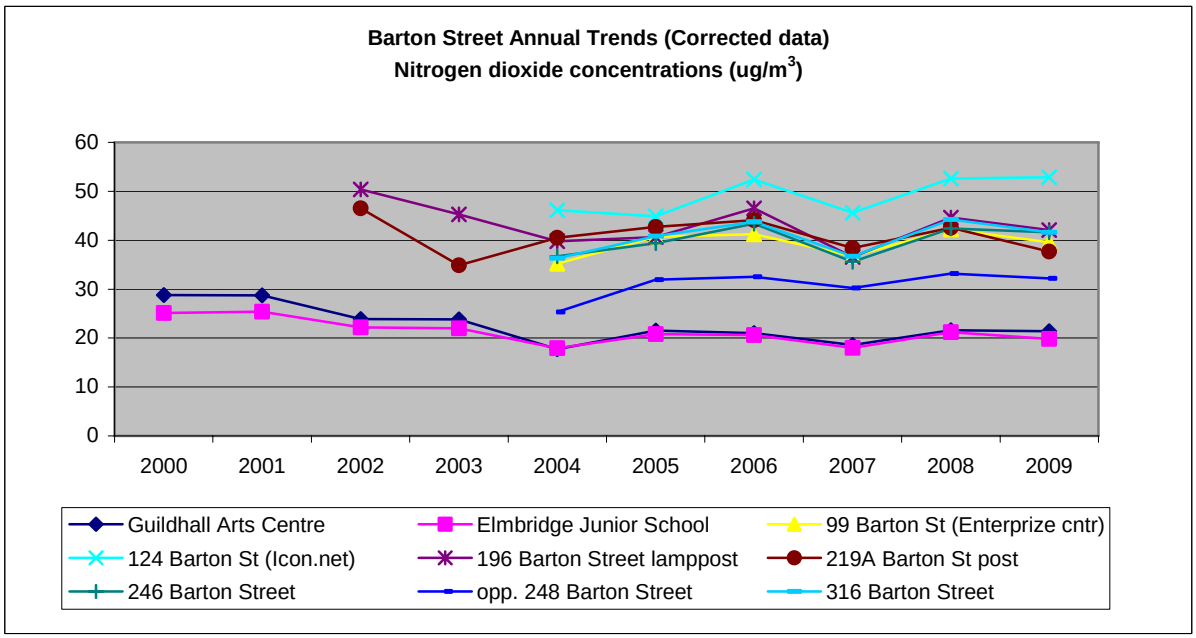


Fig 2.4c Priory Road AQMA

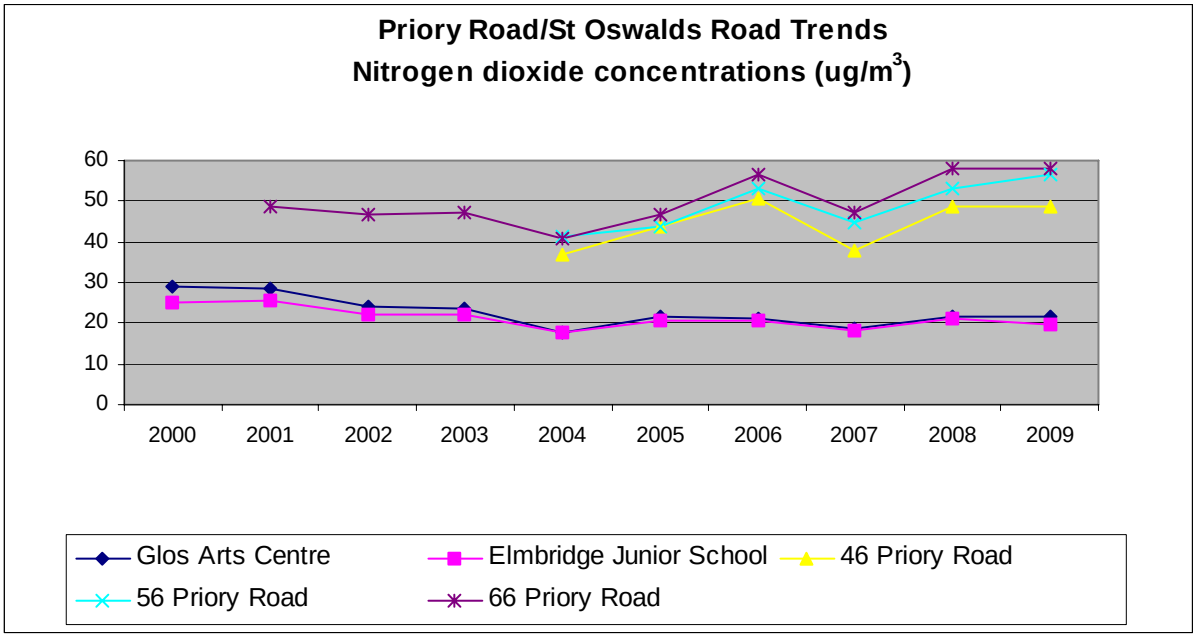


Fig 2.4d Painswick Road AQMA

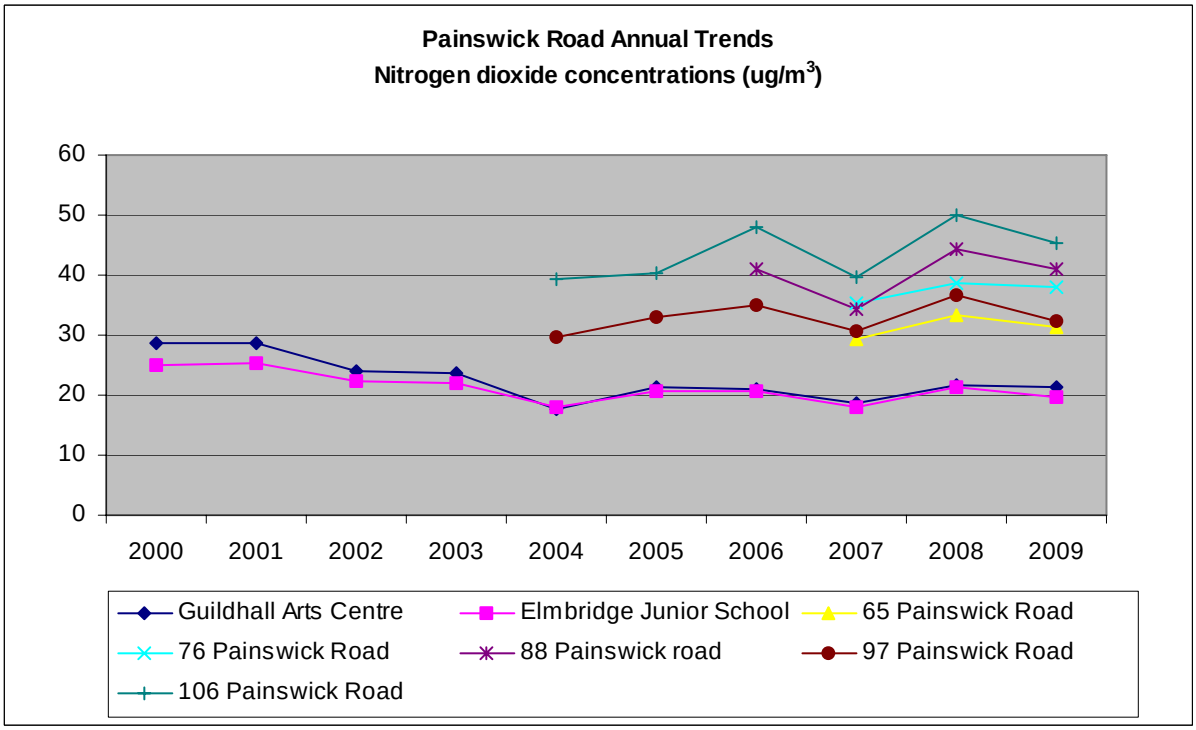


Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes

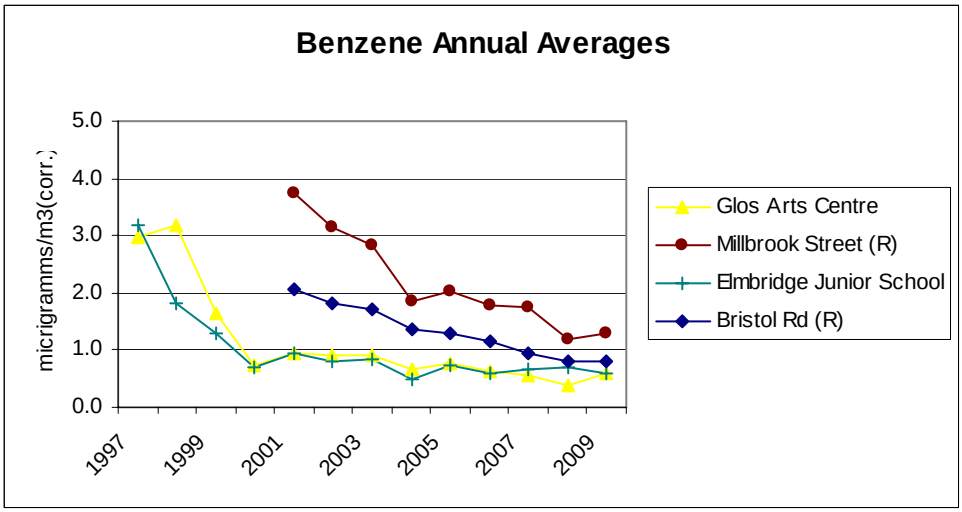
Site ID	Location	Within AQMA?	Data Capture for monitoring period[a] %	Data Capture for full calendar year 2009[b] %	Annual mean concentrations (µg/m^3)		
					2007 [c, d]	2008 [c,d]	2009 [c]
1	Guildhall	N	92	92	18.6	21.6	21.5
2	Elmbridge JS	N	92	92	18.0	21.2	19.1
3	79 Millbrook st	N	100	100	31.5	36.0	35.0
4	61 Bristol Rd lamppost	N	100	100	33.5	38.5	37.7
5	59 Bristol Rd	N	100	100	27.8	34.3	31.5
6	157 Bristol road	N	100	100	27.7	31.5	29.5
7	35 Buscombe Gdr	N	100	100	26.4	33.7	31.4
8	Orchard Park	N	100	100	22.4	28.1	26.1
9	46 Priory Rd	Y	100	100	39.8	**48.7**	**47.7**
10	56 Priory Road	Y	100	100	**45.0**	**53.2**	**55.0**
11	66 Priory Road	Y	100	100	**47.6**	**57.8**	**56.0**
12	Rear 58 Priory	Y	100	100	28.6	34.0	29.4
13	St Oswalds Wess Garage	N	100	25			**63.9***
14	St Oswalds VW garage	Y	80	42			**96.6***
15	99 Barton St	Y	100	100	36.8	**42.2**	39.1
16	124 Barton St	Y	100	100	**45.6**	**52.6**	**51.6**
17	196 Barton St	Y	100	100	36.6	**44.6**	37.5
18	219A Barton St	Y	100	100	38.4	**42.5**	37.4
19	End Vauxhall Terr	Y	83	83	20.9	24.6	24.6
20	246 Barton St	Y	100	100	35.6	**42.4**	**40.8**
21	Opp. 248 Barton	Y	100	100	30.2	33.2	32.6
22	316 Barton St	Y	100	100	36.9	**44.2**	**40.9**
23	301 Barton st	Y	100	100	24.1	28.3	29.7
24	65 Painswick rd	N	100	100	29.3	33.3	30.8
25	76 Painwick rd	N	100	100	35.5	38.6	37.2
26	88 Painswick rd	Y	100	100	34.3	**44.3**	39.8
27	97 Painswick rd	Y	92	92	27.6	36.6	34.8
28	106 Painswick Rd	Y	100	100	35.6	**49.9**	**43.7**
29	53 Barnwood rd	N	92	92	31.0	38.3	**40.6**
30	61 Barnwood RD	N	92	92	33.7	**45.0**	**42.5**

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%.)
* These results not annualised as they are illustrative rather than useful.

2.2.2 Benzene

Monthly data for benzene is given in Appendix B. No concentrations are approaching levels of concern. It is recommended that sampling for benzene be discontinued.

A trend graph is shown here.



2.2.3 Summary of Compliance with AQS Objectives

Gloucester City Council has examined the results from monitoring in the City. Concentrations outside of the AQMAs are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

In the paragraphs below, relevance is described in the guidance manual. This does not imply that new developments have not taken place in 2009.

3.1 Road Traffic Sources

None relevant

3.2 Other Transport Sources

None Relevant

3.3 Industrial Sources

None

3.4 Commercial and Domestic Sources

None relevant

3.5 New Developments with Fugitive or Uncontrolled Sources

None relevant. Some biomass burning is under consideration, but has not reached detailed planning stage.

Gloucester City council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

4 Local / Regional Air Quality Strategy

The county of Gloucestershire constitutes six local authorities, some of which have identified locations where pollutant concentrations may exceed national targets in future. Traffic emissions are primarily responsible for the elevated concentrations at such pollution 'hot spots', and reductions in traffic emissions will be necessary to improve local air quality across the Gloucestershire area.

For those local authorities requiring the development of air quality action plans both now and in future, the assistance and collaboration of a variety of stakeholders, agencies and others is necessary. Of particular importance is the assistance of transport planning and land-use planning functions within local authorities and the County Council in providing the means to improve air quality.

Whilst communication and collaboration are essential in working towards the improvement of air quality *within* local authorities, collaborative efforts *across* the county are essential for long-term air quality improvements. The South West Regional Development Agency and Government Office for the South West offer opportunities for ensuring air quality is considered at a regional level with respect to regional transport and land-use planning. The Highways Agency and Environment Agency, the newly established Public Health Trusts, business and commerce across the region and members of the public are important stakeholders that form the partnership approach to improving air quality across the area.

The six local authorities of Gloucestershire work actively work together, to seek air quality improvements, through the Gloucestershire Pollution Group (GPG). Future funding mechanisms, for the routine requirements of local air quality management and for the implementation of initiatives, will be best achieved through a collaborative Pollution Group approach. Future proposed revisions of the national Air Quality Strategy, national air quality objectives and the introduction of newly regulated pollutants are best addressed through the work of this Group.

The development of a County-wide Air Quality Strategy for Gloucestershire provides 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, so too the need for 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 local authorities and the County will need to take account of local air quality, for the benefit of communities now and in future across the Gloucestershire. The need to address climate change will also require integration with plans to improve air quality locally across the County.

The AQS was drawn up in 2004 by UWE on behalf of the GPG and is currently undergoing revision within and by the GPG. The current strategy and its future replacement will be found at www.gloucester.gov.uk/pollution, following the *air quality* link.

5 Planning Applications

No planning applications that have a likely material effect on air quality in the city have been approved this year. There is close liaison between Environmental Health and Planning departments to ensure potential air quality issues are discussed at an early stage.

Current issues not yet reaching the formal planning stage are:

A proposal for new housing in the Railway Triangle by Network Rail. This area is partly within the area around Myers Road currently the subject of a detailed assessment for PM10.

A school biomass boiler is proposed. Current information shows it is unlikely to affect air quality.

6 Air Quality Planning Policies

The City currently has no formal policy specifically dealing on its own with air quality, although policies imply that air quality is a material fact.

Current planning policy documents can be found at
http://www.gloucester.gov.uk/CouncilServices/Planning/planning.aspx

Comment on planning policy is welcome at pdc@gloucester.gov.uk

7 Local Transport Plans and Strategies

The local transport plan is a County Council plan, which may be found at www.gloucestershire.gov.uk/ltp2. This plan is currently being revised, and takes account of the various Air Quality Management Areas in the County. The draft Action Plan for our current three AQMAs was taken into account during the formation of the plan. The county council devised most of the proposed Actions in the plan, as they involve traffic, the main cause of the problem. It has not been possible to discuss the improvement to the LTP and Action Plan with County officers in the timescale for submitting this document. The County is aware of the need to create a further AQMA, which will be considered as the LTP is revised.

8 Climate Change Strategies

The City Council has adopted a climate change strategy, which may be found at http://www.gloucester.gov.uk/Documents/councilservices/Planning/ClimateChange/ClimateChangeStrategy2008-2010Nov08.pdf

It covers the period July 2008- July 2010 and is thus due for review this year. Climate change strategy falls within the Regeneration Directorate of the City Council. Comment on the strategy is welcome at pdc@gloucester.gov.uk

The current objectives of the strategy are:

To increase public awareness of Climate Change, and of what people and the organisations they represent can do to lessen their impacts upon the climate and how they can adapt to a changed climate.

To maximize the reduction in greenhouse gas emissions over the strategy period and where possible exceed government and regional targets.

To increase the amount of electricity that is generated in Gloucester from low carbon or renewable sources to a minimum of 11% by 2010 in line with Regional Planning Guidance for the South West.

To enable Gloucester, its citizens and biodiversity to adapt to the changes brought about by climate change to ensure the maintenance of a high quality of life.

With the advent last year of National Indicator 185, a standardised method of measuring the output of carbon dioxide by local authority's own activities, it will be possible to see if strategies are working within a few years. The method is not easy to follow as not all the data is routinely collected by all authorities.

9 Implementation of Action Plans

The Action Plan progress report will be submitted separately as it has not been possible to conclude talks with the County in the timescale required for submission of this document.

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

The monitoring data shown in Chapter 2 is discussed here. Detailed monthly data is given in the Appendices.

Benzene

The concentration of benzene continues to decline. It is recommended that benzene monitoring be discontinued.

Nitrogen dioxide – outside AQMAs

Firstly discussing the areas outside the AQMAs and possible AQMAs, we note that the two sites (Guildhall and Elmbridge Junior school) used as urban background continue to give concentrations in the same order as that calculated Nationally for the relevant grid squares. These results are shown for comparison on the various trend graphs.

The Millbrook Street site is the nearest house to the level crossing, with a vehicular fly-over intervening. The nitrogen dioxide levels have risen sharply in the past two years from below 30ug/m3 to about 35ug/m3. This site needs further watching. Actions to curb through traffic on Barton street may have the effect of increasing traffic at this point.

The Bristol Road lamp post site now gives 37.7ug/m3. However the receptor site, the façade behind (59 Bristol road) remains comfortably lower. 157 Bristol Road is also a receptor site and this remains comfortably lower, as the traffic on Bristol road has declined with the recent bypass completion.

The two sites chosen as the nearest properties to the M5 motorway continue to give comfortably low concentrations.

Nitrogen dioxide –Priory road AQMA

Two new monitoring sites were briefly used at the beginning of the year, one at the roadside by the Wessex Garage on St Oswalds Road, just outside the AQMA and one roadside by the first vehicle in the traffic light queue. They were about 2m above road level. These sites at ankle level on the high level footway under the bridge were subject to vandalism and were soon ceased as a result. As might be expected the concentrations by the traffic lights were over 100ug/m3 for three of the four months with data, and averaged over 60ug/m3 at the tail of the queue by the Wessex garage. Neither site has relevant receptors, but does illustrate the higher concentrations that find their way along the road to the Priory road properties. Fig 2.4c shows that concentrations of nitrogen dioxide at the receptors have risen, but steadied in the last two years. The AQMA must remain in force.

Nitrogen dioxide – Barton Street AQMA

While several locations in this AQMA remain below the target level of 40ug/m3, it is sensible to maintain the area of the AQMA. The higher concentrations are all on the west side of the street. The sample at the rear of the street (End Vauxhall Terrace) shows that the concentrations behind properties remain low, thus justifying our advice to ventilate Barton Street properties from the rear whenever a planning application arises. Trend graph Fig 2.4b shows that in general concentrations may have stopped rising. A chemiluminescence analyser has been installed by the county council just outside the canyon at its narrowest (outside the abandoned B&Q site). This has shown very few instances where the hourly target is briefly breached, and the long term average is likely to be remarkably low, considering the sampler is within 20m of the site with the highest annual average.

Nitrogen Dioxide – Painswick Road AQMA

The trend graph Fig. 2.4d shows that nitrogen dioxide concentrations may be declining, but several year's monitoring will be needed before considering any revocation of the AQMA. The sites at 65 and 76 Painswick road are monitored to ensure that the affected area is not increasing in size.

Nitrogen Dioxide – proposed Barnwood Road AQMA

The area where there is a group of dwellings close to the kerb on Barnwood road has been of concern over several years. The only location where there is a terrace of 7 dwellings close enough to the kerb is between Elmbridge road and the Cross Keys public house. There are isolated dwellings close to the kerb on the section of Barnwood road to the south of the ring road, but traffic levels are much lower there, so there is no need to monitor at such locations.

The trend graph at Fig.2.4a shows that nitrogen dioxide levels have risen steadily over several years. This year both diffusion tubes had annual average nitrogen dioxide concentrations above 40ug/m3. While it is normal to put continuous monitors at sites for detailed assessment, this was not possible due to the very small gardens and comparatively narrow pavement. The area involved is so small that it was also impractical to put more diffusion tubes in the area. The dwellings on either side of this terrace are set well back from the road. The dwellings on the opposite side of the road are also set back. Previous monitoring has taken place [2002] on the opposite side of the road, which confirmed that concentrations of nitrogen dioxide were unlikely to be of concern. The County has installed traffic counting devices in the vicinity.

10.2 Conclusions relating to New Local Developments

The detailed assessment of PM10 in the vicinity of Myers Road, which is just starting, will have a bearing on the desirability or otherwise of new housing proposed for the Railway Triangle. The area supports a number of potentially dusty industries: skip hire and recycling of contents, sand and gravel sales, ready mixed concrete batching, coal yards.

Co-operation with planners ensures that any proposals for dwellings very near to highways are scrutinised for air quality potential problems. A number of proposals have been altered to reduce the proximity to traffic.

10.3 Proposed Actions

New monitoring shows that no further detailed assessments are currently required other than that ongoing in the Myers Road area. No changes are proposed in any of the existing AQMAs.

The proposed new AQMA at Barnwood Road should be declared within six months of acceptance of this report, after consultation with residents and other stakeholders.

Monitoring data suggests that benzene monitoring can be discontinued.

The next action should be the publication of a report on the detailed assessment in the Myers Road area. The date of this cannot be predicted, as the equipment has not yet been installed. It will be possible to report if the first three months show that PM10 is not likely to be a problem. However if some exceedences are observed in that three months, a continuation of the assessment will be required for up to a year to determine if the annual mean or the 24 hr mean might be exceeded, as up to 35 exceedences are permitted per year before the 24hr limit is broken.

A Progress Report will be submitted in April 2011.

11 References

Air Quality Assessment Stages 2 & 3 (Dec 2000)

Updating and Screening Assessment for 2002 (May 2003)

All items below are accessible online through www.gloucester.gov.uk/pollution

An Air Quality Strategy for Gloucestershire (UWE 2004)

Detailed Assessment for 5 areas in the City (Dec 2004)

Progress Report for 2004 (May 2005)

Barton Street Air Quality Management Order (Aug 20050

Priory Road Air Quality Management Order (Aug 2005)

Updating and Screening Assessment 2005 (May 2006)

Gloucestershire CC Local Transport Plan 2006-11

Progress Report for 2006 (April 2007)

Detailed Assessment for Painswick Road (2007)

Painswick Road Air Quality Management Order (Oct 2007)

Progress Report for 2007 (April 2008)

Draft Action Plan for Air Quality Management Areas (July 2008)

Gloucester City Council Climate Change Strategy 2008-10

Updating and Screening Assessment for 2008 (April 2009)

Bristol Scientific Services WASP results (private communication)

UWE R&A website

Appendices

Appendix A: QA/QC Data

Benzene and nitrogen dioxide tubes were supplied and analysed by Bristol Scientific Services, who assure us that the National laboratory guidance for nitrogen dioxide tubes has been followed during the year in question. The WASP results are pictured below. The bias adjustment factor is taken from the R&A website March 2010 spreadsheet., giving 0.84. No co-location tubes were used. It has been found difficult to obtain a vandalproof sampling method at the Barton Street site at an affordable cost. This has not been pursued.

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 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-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	07/01/2009	04/02/2009	139.1	140.6	140.3	140	0.8	1	2.0	114	99.1	Good	Good
2	04/02/2009	04/03/2009	114.4	103.3	95.1	104	9.7	9	24.1	97	98.1	Good	Good
3	04/03/2009	31/03/2009	113.7	119.3	117.8	117	2.9	2	7.2	112	99.4	Good	Good
4	31/03/2009	29/04/2009	118.6	115.4	115.6	117	1.8	2	4.5	103	99.4	Good	Good
5	29/04/2009	03/06/2009	128.2	128.1	127.4	128	0.4	0	1.1	107	99.5	Good	Good
6	03/06/2009	01/07/2009	118.7	113.4	127.2	120	7.0	6	17.3	100	99.6	Good	Good
7	01/07/2009	29/07/2009								117	99.6		Good
8	29/07/2009	02/09/2009	124.6	122.6	140.0	129	9.5	7	23.7	115	99.2	Good	Good
9	02/09/2009	30/09/2009	103.4	108.4	110.8	108	3.8	4	9.4	84	95.1	Good	Good
10	07/10/2009	04/11/2009	132.2	133.7	131.0	132	1.4	1	3.4	112	99.3	Good	Good
11	04/11/2009	02/12/2009	160.9	157.5	159.1	159	1.7	1	4.2	126	99.6	Good	Good
12	02/12/2009	07/01/2010	126.1	121.4	133.4	127	6.0	5	15.0	103	99.5	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

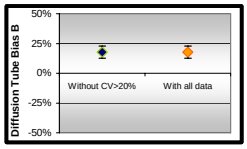
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Bristol - Intercomp 2009

Precision: 11 out of 11 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 11 periods of data
Bias factor A 0.85 (0.81 - 0.89)
Bias B 18% (13% - 23%)
Diffusion Tubes Mean: 125 µgm^{-3}
Mean CV (Precision): 3
Automatic Mean: 107 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 107 (102 - 112) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A 0.85 (0.81 - 0.89)
Bias B 18% (13% - 23%)
Diffusion Tubes Mean: 125 µgm^{-3}
Mean CV (Precision): 3
Automatic Mean: 107 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 107 (102 - 112) µgm^{-3}



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Version 03 - November 2006

Appendix B
Monthly sampling data

2009 Nitrogen Dioxide corrected monthly data

All values microgrammes per cubic metre

No.	Location	Jan-09 Bias-adj	Feb-09 Bias-adj	Mar-09 Bias-adj	Apr-09 Bias-adj	May-09 Bias-adj	Jun-09 Bias-adj	Jul-09 Bias-adj	Aug-09 Bias-adj	Sep-09 Bias-adj	Oct-09 Bias-adj	Nov-09 Bias-adj	Dec-09 Bias-adj	Average Adj
	Sites previously in national monitoring programme													
1	Glos Guildhall	30.9	28.8	22.8		15.6	17.9	12.6	13.3	18.2	24.6	21.8	29.9	21.5
2	Elmbridge Junior School	26.9	27.1	21.2	19.4	13.5	15.0	13.0	13.6	17.9	21.6	20.7		19.1
3	79 Millbrook Street	40.7	48.2	40.2	32.1	25.5	32.8	25.2	24.4	36.0	37.4	31.2	47.0	35.0
4	61 Bristol Rd lamp post	48.4	44.9	36.8	41.2	30.0	33.6	25.4	29.7	35.9	42.2	41.8	42.6	37.7
	Bristol Road sites													
5	59 Bristol Road	36.5	39.5	32.1	34.5	23.6	26.7	29.4	29.7	26.9	33.3	29.0	37.3	31.5
6	157 Bristol Road	37.0	36.0	29.0	31.4	25.5	23.6	23.1	22.8	25.4	33.4	30.5	36.5	29.5
	Sites near M5 Motorway													
7	35 Buscombe Gardens	37.1	33.1	31.0	36.2	31.2	31.4	26.2	26.0	26.2	34.2	29.2	35.4	31.4
8	12 Orchard Park Green Lane	33.4	30.5	27.1	26.5	22.6	26.1	19.8	19.8	25.3	27.4	25.4	29.4	26.1
	Priory Road AQMA Area													
9	46 Priory Road	54.4	52.9	48.6	43.9	44.4	49.8	42.5	42.7	44.5	50.6	44.4	53.9	47.7
10	56 Priory Road	55.4	59.8	53.0	59.5	53.8	57.1	49.7	49.1	54.3	56.1	53.3	58.5	55.0
11	66 Priory Road	61.7	60.1	56.7	55.4	53.3	63.0	51.0	42.8	57.5	64.7	47.7	57.7	56.0
12	Rear 58 Priory Road	35.8	38.0	29.9	34.2	24.3	29.3	16.2	16.7	31.2	29.0	29.3	39.1	29.4
13	St Oswald A nr Wessex Gge	54.4	62.7	74.6										
14	St Oswald B nr VW garage	107.6	106.9		103.7	68.3								
	Barton Street AQMA Area													
15	99 Barton St (Enterprize cntr)	40.2	50.8	44.4	39.4	25.7	37.7	30.4	28.9	39.6	46.3	37.0	48.4	39.1
16	124 Barton St (Icon.net)	58.0	66.8	62.8	50.9	33.1	45.6	45.5	41.5	44.4	55.0	57.8	58.0	51.6
17	196 Barton Street lamppost	47.6	50.0	47.5	0.0	20.7	36.8	32.0	35.4	42.2	51.3	42.8	43.9	37.5
18	219A Barton St post	40.8	49.9	43.4	47.6	22.8	39.2	28.1	26.0	26.0	44.6	31.6	48.9	37.4
19	End Vauxhall Terrace	28.6	31.2	26.1	25.3	17.3			15.3	19.8	25.6	23.1	33.9	24.6
20	246 Barton Street	45.1	48.9	45.4	39.6	24.2	34.3	34.8	35.1	33.3	43.6	57.9	47.9	40.8
21	opp. 248 Barton Street	30.2	44.0	35.5	37.7	22.8	33.0	22.0	19.3	33.3	34.8	29.1	49.1	32.6
22	316 Barton Street	37.4	47.3	47.1	43.3	29.7	36.9	37.0	36.0	39.2	46.5	41.8	48.6	40.9
23	301 Barton Street	50.1	34.9	30.4	29.8	17.9	24.8	17.8	18.7	39.2	29.2	26.1	37.3	29.7
	Painswick Road AQMA Area													
24	65 Painswick Road	36.9	40.6	29.6	35.7	27.3	32.2	20.2	19.7	31.1	33.5	24.9	38.2	30.8
25	76 Painswick Road	45.1	46.0	37.2	38.5	29.6	33.7	30.8	32.1	34.4	40.1	35.4	43.5	37.2
26	88 Painswick Road	45.9	43.4	42.5	44.4	33.4	37.3	36.4	33.7	36.1	43.4	38.6	41.8	39.8
27	97 Painswick Road	38.4	42.3	35.7	38.1	26.5	30.3	21.8	26.3	55.3		27.0	40.7	34.8
28	106 Painswick Road	48.7	47.7	43.5	47.5	40.1	41.7	40.4	36.1	42.3	49.8	44.5	41.8	43.7
	Barnwood Road													
29	53 Barnwood Road	44.3	49.6		46.1	34.1	44.5	33.3	27.7	41.9	37.8	37.5	49.9	40.6
30	61 Barnwood Road	45.1	46.8	39.2	48.6	38.8	48.9		25.6	44.2	43.8	34.8	52.0	42.5

Sites Above National Objective

Bias adjustment 0.84 from http://www.uwe.ac.uk/aqm/review/R&Asupport/diffusiontube310310.xls

Raw Monthly Nitrogen Dioxide Data

2009 Nitrogen Dioxide raw monthly data

All values microgrammes per cubic metre — *Raw data all archived on airquality.co.uk website*

No.	Location	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Average
	Sites previously in national monitoring programme													
1	Glos Guildhall	36.8	34.3	27.1		18.6	21.3	15.0	15.8	21.7	29.3	26.0	35.6	25.6
2	Elmbridge Junior School	32.0	32.3	25.2	23.1	16.1	17.8	15.5	16.2	21.3	25.7	24.7	0.0	20.8
3	79 Millbrook Street	48.4	57.4	47.8	38.2	30.3	39.1	30.0	29.1	42.9	44.5	37.1	55.9	41.7
4	61 Bristol Rd post	57.6	53.4	43.8	49.1	35.7	40.0	30.2	35.3	42.7	50.2	49.8	50.7	44.9
	Bristol Road sites													
5	59 Bristol Road facade	43.4	47.0	38.2	41.1	28.1	31.8	35.0	35.3	32.0	39.7	34.5	44.4	37.5
6	157 Bristol Road	44.1	42.9	34.5	37.4	30.3	28.1	27.5	27.2	30.2	39.8	36.3	43.5	35.2
	Sites near M5 Motorway													
7	35 Buscombe Gardens	44.2	39.4	36.9	43.1	37.1	37.4	31.2	30.9	31.2	40.7	34.8	42.2	37.4
8	12 Orchard Park Green Lane	39.8	36.3	32.3	31.5	26.9	31.1	23.6	23.6	30.1	32.6	30.2	35.0	31.1
	Priory Road AQMA Area													
9	46 Priory Road	64.8	63.0	57.8	52.3	52.8	59.3	50.6	50.8	53.0	60.2	52.8	64.2	56.8
10	56 Priory Road	66.0	71.2	63.1	70.8	64.0	68.0	59.2	58.4	64.7	66.8	63.5	69.6	65.4
11	66 Priory Road	73.4	71.6	67.5	65.9	63.4	75.0	60.7	51.0	68.5	77.0	56.8	68.7	66.6
12	Rear 58 Priory Road	42.6	45.2	35.6	40.7	28.9	34.9	19.3	19.9	37.2	34.5	34.9	46.6	35.0
13	St Oswald A nr Wessex Gge	64.8	74.6	88.8			Discontinued due to vandalism							
14	St Oswald B nr VW garage	128.1	127.3		123.5	81.3	Discontinued due to vandalism							
	Barton Street AQMA Area													
15	99 Barton St (Enterprize cntr)	47.8	60.5	52.9	46.9	30.6	44.9	36.2	34.4	47.2	55.1	44.1	57.6	46.5
16	124 Barton St (Icon.net)	69.1	79.5	74.8	60.6	39.4	54.3	54.2	49.4	52.8	65.5	68.8	69.1	61.5
17	196 Barton Street lamppost	56.7	59.5	56.6		24.6	43.8	38.1	42.1	50.2	61.1	51.0	52.3	48.7
18	219A Barton St post	48.6	59.4	51.7	56.7	27.2	46.7	33.4	30.9	30.9	53.1	37.6	58.2	44.5
19	End Vauxhall Terrace	34.1	37.2	31.1	30.1	20.6			18.2	23.6	30.5	27.5	40.4	29.3
20	246 Barton Street	53.7	58.2	54.0	47.1	28.8	40.8	41.4	41.8	39.6	51.9	68.9	57.0	48.6
21	opp. 248 Barton Street	36.0	52.4	42.3	44.9	27.2	39.3	26.2	23.0	39.7	41.4	34.6	58.5	38.8
22	316 Barton Street	44.5	56.3	56.1	51.5	35.3	43.9	44.0	42.8	46.7	55.4	49.8	57.8	48.7
23	301 Barton street	59.7	41.5	36.2	35.5	21.3	29.5	21.2	22.3	46.7	34.8	31.1	44.4	35.4
	Painswick Road AQMA Area													
24	65 Painswick Road	43.9	48.3	35.2	42.5	32.5	38.3	24.0	23.4	37.0	39.9	29.7	45.5	36.7
25	76 Painswick Road	53.7	54.8	44.3	45.8	35.2	40.1	36.7	38.2	40.9	47.7	42.2	51.8	44.3
26	88 Painswick Road	54.7	51.7	50.6	52.9	39.8	44.4	43.3	40.1	43.0	51.7	45.9	49.8	47.3
27	97 Painswick Road	45.7	50.3	42.5	45.3	31.5	36.1	26.0	31.3	65.8	0.0	32.2	48.4	37.9
28	106 Painswick Road	58.0	56.8	51.8	56.5	47.7	49.7	48.1	43.0	50.3	59.3	53.0	49.8	52.0
	Barnwood Road													
29	53 Barnwood Road	52.7	59.0		54.9	40.6	53.0	39.6	33.0	49.9	45.0	44.7	59.4	48.3
30	61 Barnwood Road	53.7	55.7	46.7	57.9	46.2	58.2		30.5	52.6	52.2	41.4	61.9	50.6

Benzene Monthly data

Benzene data (corrected)

microgram/m3	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	**Annual**
Glos Arts Centre	1.2	1.0	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.8	**0.6**
Millbrook Street	2.5	2.3	1.4	0.8	1.0	1.0	0.6	0.8	1.0	1.6	1.0	2.0	**1.3**
Elmbridge Junior School	1.4	0.8	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.8	**0.6**
Bristol Rd	2.0	1.6	1.0	0.6	0.6	0.6	0.4	0.4	0.4	0.8	0.4	1.4	**0.8**