



2015 Updating and Screening Assessment for Gloucester City Council

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

Sept 2015

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Executive Summary

Part IV of the Environment Act 1995 places a statutory duty on local authorities to review and assess the air quality within their area and take account of Government Guidance when undertaking such work. This 2015 Air Quality Updating and Screening Assessment for Gloucester City Council is a requirement for all local authorities. The report has been prepared in accordance with Technical Guidance LAQM.TG (09) and associated tools.

This report is intended to consider any matters not previously considered by Gloucester City Council. If any items appear not to be mentioned, they have been considered before and are not considered to give rise to potential problems with the air quality of the City of Gloucester. All previous reports are available on the City's website at www.gloucester.gov.uk/pollution

New nitrogen dioxide monitoring data is included, which confirms the continuing need for our existing Air Quality Management Areas.

Proposed actions arising from the 2015 USA Report are as follows:

- Continue diffusion tube monitoring in the City to identify future changes in pollutant concentrations;
- Proceed to the Progress Report 2016

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1 Introduction

1.1 Description of Local Authority Area

Gloucester is a small City (population circa 110,000) situated on the left bank of the tidal River Severn and backed by the Cotswold escarpment. The prevailing winds are from the southwest and follow a passage up the river, channelled by the hills in the distance to either side. The M5 motorway forms the eastern boundary of much of the City. The City is densely populated in comparison to its surrounding neighbouring District Councils (Stroud District Council, Forest of Dean District Council and Tewkesbury Borough Council) which are predominantly rural.

Gloucester is home to the Hempsted Landfill Site situated in the North West corner of the City and which benefits from an A1 environmental permit issued by the Environment Agency. 44 activities hold an environmental permit with the Council with one of these, an aluminium foundry and smelting process, being an A2 process. The majority of activities that are regulated by the Council are loading/unloading of petrol, waste oil burners, vehicle refinisher's and dry cleaners.

The main source of air pollution in the City that gives rise to concern for compliance is road traffic emissions from major roads, notably the A417, A430 and A38 which connect Gloucester with the main highway network in Gloucestershire, as well as local traffic in the centre of Gloucester.

Three Air Quality Management Areas (AQMAs) have been declared in Gloucester due to exceedences of the annual mean objective for NO₂: Barton Street AQMA (in the City centre) and Priory Road AQMA (on the A417), both declared in 2005; and Painswick Road AQMA (in the City centre, consisting of further section of Barton Street), declared in 2007.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in England are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003

Lead	0.5 µg/m ³	Annual mean	31.12.2004
	0.25 µg/m ³	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m ³	Annual mean	31.12.2005
Particles (PM₁₀) (gravimetric)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m ³	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Table 1-2 provides a summary of the previous reports completed by Gloucester City Council as part of the LAQM Review and Assessment process.

Report	Summary
2005 AQMA declaration	Barton Street AQMA and Priory Road AQMA declared due to exceedences of the annual mean objective for NO ₂ .
2006 Updating and Screening Assessment	This report indicated that a detailed assessment was required in respect of NO ₂ at a length of Painswick Road as the annual mean objective was likely to be exceeded and an AQMA may need to be declared.
2007 AQMA declaration	Painswick Road AQMA declared due to exceedences of the annual mean objective for NO ₂ .
2007 Progress Report	<p>This report confirmed that a detailed assessment was carried out at Painswick Road during 2006, the results of which confirmed that an AQMA was required in respect of NO₂ as the annual mean objective had been breached for the second occasion. The Painswick Road AQMA was declared during 2007.</p> <p>Air Quality Action Plans for Barton Street and Priory Road were still under development in conjunction with Gloucestershire County Council Highways.</p> <p>A detailed assessment was recommended at the area of Barnwood Road where monitoring results showed exceedences of annual mean NO₂.</p>

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2008 Progress Report	<p>This progress report incorporated the detailed assessment for Barnwood Road and the annual report on progress in respect of the Barton Street, Priory Road and Painswick Road AQMAs.</p> <p>The report confirmed that an AQMA was not required at the area of Barnwood Road. Further monitoring in the area was recommended.</p> <p>Action plans were still being developed in conjunction with Gloucestershire County Council and consideration being given to linking this document in with the Local Transport Plan.</p>
2009 Updating and Screening Assessment	<p>The report confirmed that levels of measured NO₂ within the Barton Street, Priory Road and Painswick Road AQMAs were still exceeding the annual mean objective for NO₂. Once again it was highlighted that a further detailed assessment was required in respect of NO₂ for a section of Barnwood Road. Furthermore, it was identified that a detailed assessment was required for an area of housing estate off Myers Road Industrial Estate in respect of PM₁₀.</p>
2010 Progress Report	<p>The report confirmed that levels of measured NO₂ within the Barton Street, Priory Road and Painswick Road AQMAs were still exceeding the annual mean objective for NO₂. Following detailed assessments for both Barnwood Road and Myers Road it was found that levels of NO₂ and PM₁₀ were not breaching relevant objectives and declaring an AQMAs was not required.</p> <p>The report confirmed that there were no other locations of concern at that time.</p>
2011 Progress Report	<p>The report confirmed that levels of measured NO₂ within the Barton Street, Priory Road and Painswick Road AQMAs were still exceeding the annual mean objective for NO₂. The report confirmed that there were no other locations of concern at that time.</p>
2012 Updating and Screening Assessment	<p>The report confirmed that levels of measured NO₂ within the Barton Street, Priory Road and Painswick Road AQMAs were still exceeding the annual mean objective for NO₂. It also outlined that it was our intention to investigate the possibility of merging the Barton Street and Painswick Road AQMAs given they are in effect the same section of road and will benefit from co-ordinated solutions.</p> <p>Within the report it was confirmed that the Council would install a NO₂ continuous analyser within the Priory Road AQMA.</p>
2013 Progress Report	<p>The report confirmed that levels of measured NO₂ within the Barton Street, Priory Road and Painswick Road AQMAs were still exceeding the annual mean objective for NO₂. The report confirmed that there were no other locations of concern at that time.</p> <p>A decision was taken to cease continuous monitoring at Barton Street due to resource implications.</p>
2014 Progress Report	<p>The report confirmed that there were no exceedences of the AQS objectives at any of the monitoring locations within Gloucester City Council.</p> <p>Continuous monitoring results for 2013 indicate that both the annual mean objective and the 1-hour objective for nitrogen dioxide were met at the monitoring site, having shown a significant decrease in 2013. Results from diffusion tube sites also showed that NO₂ concentrations in 2013 significantly decreased from 2012. There were no diffusion tube sites in 2013 where the annual mean AQS objective was exceeded.</p>

Map(s) of AQMA Boundaries

Maps are provided for the three existing AQMAs within Gloucester City with an additional map showing their locations within the wide city context.

Figure 1-1 Barton Street AQMA



Figure 1-3 Painswick Road AQMA



Figure 1-4 Map of Gloucester City showing locations of AQMAs



1.5 Summary of Monitoring Undertaken

1.5.1 Automatic Monitoring Sites

Gloucester City Council operated one automatic monitoring station in 2013 measuring nitrogen dioxide using a chemiluminescence analyser at B4073 Barton Street, Barton, Gloucester within the Barton Street AQMA. The station had operated since 2010 and was managed by Gloucestershire County Council until 2012 when Gloucester City Council took over responsibility for its operation. The site was closed in January 2014.

Further details of this monitoring station are provided in Table 2-1 and the location is shown in Figure 2-1 and Figure 2-2.

Figure 2.1 Map of Automatic Monitoring site



Figure 2-2 Photograph of Automatic Monitoring Site



Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
CM1	Roadside	383690	218102	NO2	Yes	Chemiluminescence	Y (2m)	4m	Yes

1.5.2 Non-Automatic Monitoring Sites

Gloucester City Council undertook monitoring using passive NO₂ diffusion tubes at 25 sites in 2014. These included one set of triplicate tubes installed at 56 Priory Road within Priory Road AQMA (not co-located).

There have been no changes in diffusion tube locations from monitoring in previous years.

The details of the NO₂ monitoring network are shown in Table 2.2 and Figure 2.3.

Figure 2.3 Map of Non-Automatic Monitoring Sites

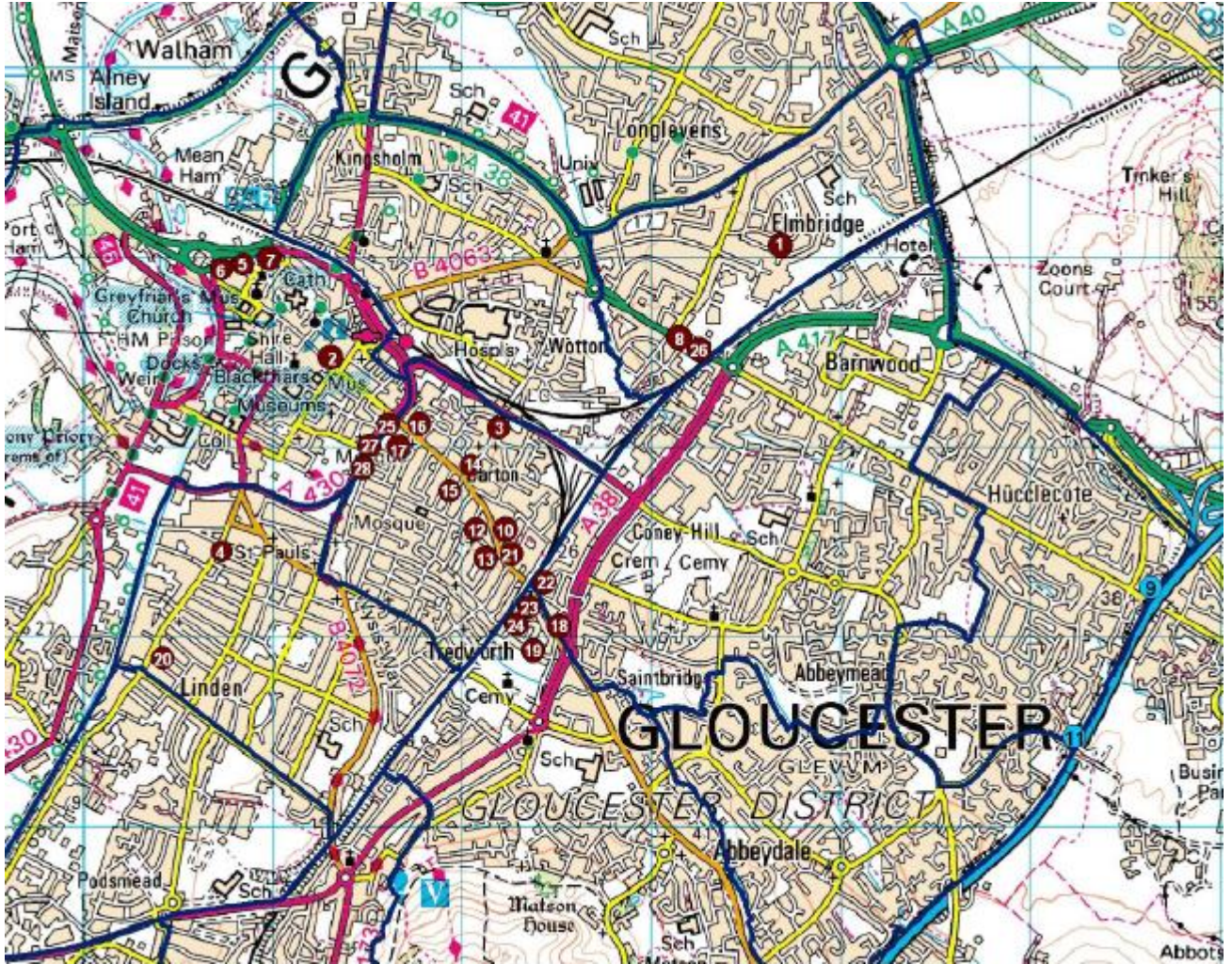


Table 2.2 Details of Non-Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
1	Gloucester Guildhall	383243	218489	NO ₂	N	N	N	N/A	N
2	Elmbridge Junior School	385430	218870	NO ₂	N	N	Y(1m)	N/A	N
3	79 Millbrook Street	384190	218160	NO ₂	N	N	Y (1m)	1.0m	Y
4	57 Bristol Rd (façade)	382690	217440	NO ₂	N	N	Y (1m)	<1m	Y
5	157 Bristol Rd	382410	217013	NO ₂	N	N	Y (1m)	6.5m	Y
6	35 Buscombe Gardens	387670	217250	NO ₂	N	N	Y (1m)	20m to M5	N
7	12 Orchard Park, Green Lane	387250	216530	NO ₂	N	N	Y (1m)	N/A	N
8	46 Priory Road	382898	219029	NO ₂	Y (Priory Road AQMA)	N	Y (1m)	5.0m	Y
9	56 Priory Road	382921	219034	NO ₂	Y (Priory Road AQMA)	Y (Triplicate)	Y (1m)	5.0m	Y

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Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
10	66 Priory Road	382950	219040	NO ₂	Y (Priory Road AQMA)	N	Y (1m)	6.0m	Y
11	99 Barton Street	383717	218094	NO ₂	Y (Barton Street AQMA)	N	Y (1m)	1.4m	Y
12	124 Barton Street	383726	218074	NO ₂	Y (Barton Street AQMA)	N	Y (1m)	1.5m	Y
13	196 Barton Street	383989	217857	NO ₂	Y (Barton Street AQMA)	N	Y (1m)	2.0m	Y
14	219A Barton St	384000	217863	NO ₂	Y (Barton Street AQMA)	N	Y (1m)	1.7m	Y
15	240 Barton Street	384081	217725	NO ₂	Y (Barton Street AQMA)	N	Y (1m)	1.5m	Y
16	Opp 250 Barton St	384090	217731	NO ₂	Y (Barton Street AQMA)	N	Y (1m)	2.5m	N

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Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
17	316 Barton Street	384175	217501	NO ₂	Y (Barton Street AQMA)	N	Y (1m)	2.4m	Y
18	301 Barton St	384182	217533	NO ₂	Y (Barton Street AQMA)	N	Y (1m)	4.8m	Y
19	65 Painswick Road	384512	217023	NO ₂	N	N	Y (1m)	5.4m	Y
20	76 Painswick Road	384490	217027	NO ₂	Y	N	Y (1m)	3.7m	Y
21	88 Painswick Road	384509	216998	NO ₂	Y (Painswick Road AQMA)	N	Y (1m)	3.8m	Y
22	97 Painswick Road	384558	216931	NO ₂	Y (Painswick Road AQMA)	N	Y (1m)	5.1m	Y
13	106 Painswick Road	384550	216932	NO ₂	Y (Painswick Road AQMA)	N	Y (1m)	3.5m	Y
24	53 Barnwood Road	385113	218595	NO ₂	N	N	Y<1m	1.5m	Y
25	61 Barnwood Road	385130	218585	NO ₂	N	N	Y (1m)	4.6m	Y

1.6 Comparison of Monitoring Results with Air Quality Objective

1.6.1 Nitrogen Dioxide

There are two Air Quality Objectives for NO₂, namely:

- the annual mean of 40µg/m³, and
- the 1-hour mean of 200µg/m³ not to be exceeded more than 18 times a year.

A summary of corrected data is given in Table 2.5, with results of concern in **RED BOLD**. The raw data is attached to this report as Appendix B. Sites 1 and 2 represent urban background. All other sites except site 4 are representative of public exposure, mostly being on facades of housing.

These results confirm that all three AQMAs are still required.

1.6.2 Automatic Monitoring Data

The Council monitored NO₂ at one location during 2013. This was the roadside site at Barton Street.

The monitoring data can be seen in Table 2-3 and Table 2-4 below. Full details of the Quality Assurance/Quality Control (AQ/QC) procedure are provided in Appendix A.

Data capture was lower than in the previous year; however annualisation was not required as data capture was above 75 %. As data capture was below 90%, the 99.8th percentile has also been reported for the hourly objective for this site.

Results for 2013 indicate that both the annual mean objective and the 1-hour objective were not exceeded at the monitoring site.

Figure 2.4 shows the trend in NO₂ concentrations from 2010 through to 2013 at the monitoring site. This shows that the site had remained above the annual mean objective until 2012; following this, concentrations showed a significant reduction in 2013. This is consistent with the diffusion tube results, which also showed significantly lower concentrations in 2013 when compared to previous year.

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The Automatic Monitoring Station is no longer required by Gloucester City Council and had not been in use for 15 months. There are no plans for future re-installment.

Table 2.3 Results of Automatic Monitoring of Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring % ^a	Valid Data Capture 2014 % ^b	Annual Mean Concentration $\mu\text{g}/\text{m}^3$				
					2010* ^c	2011* ^c	2012* ^c	2013* ^c	2014 ^c
CM1 / Barton Street	Roadside	Y	80.1	80.1	46	44	44	37.2	-

In **bold**, exceedence of the NO₂ annual mean AQS objective of 40 $\mu\text{g}/\text{m}^3$

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentrations measures at Automatic Monitoring Sites

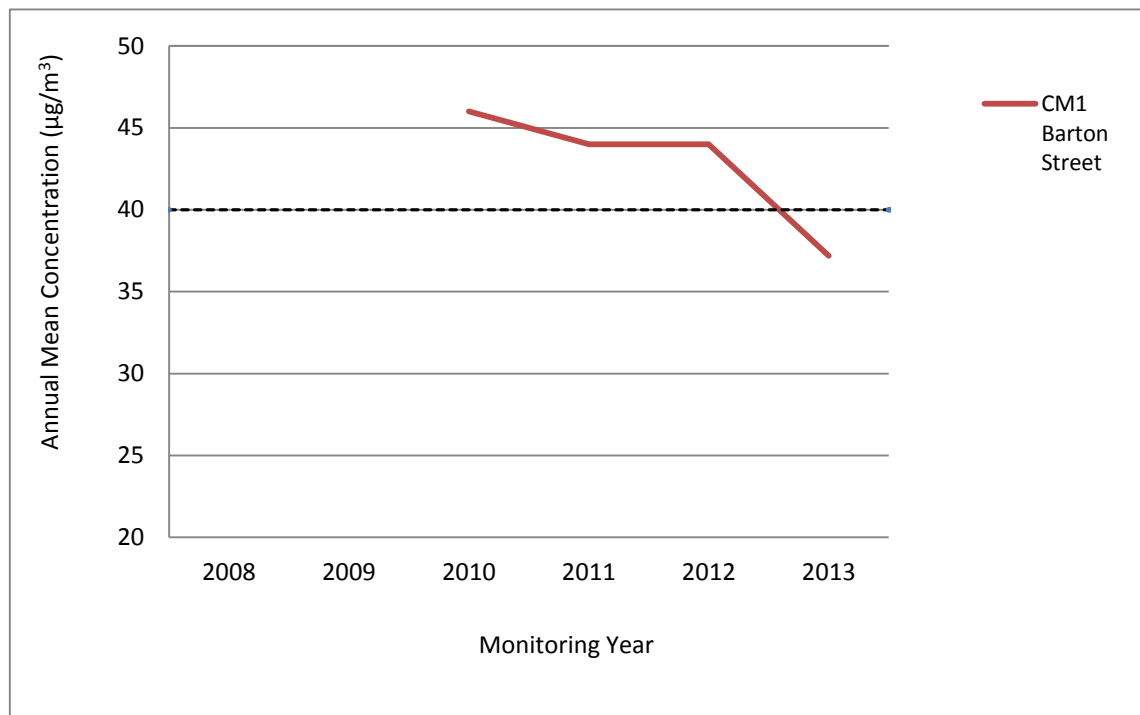


Table 2.4 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring % ^a	Valid Data Capture 2014 % ^b	Number of Exceedences of Hourly Mean (200 µg/m ³)				
					2010* ^c	2011* ^c	2012* ^c	2013* ^c	2014 ^c
CM1 / Barton Street	Roadside	Y	80.1	80.1	0	0	26.2	0 (108.9)	-

If the period of valid data is less than 90%, the 99.8th percentile of hourly means is included in brackets

In **bold**, exceedence of the NO₂ 1-hour mean AQS objective (200 µg/m³ not to be exceeded more than 18 times a year)

Diffusion Tube Monitoring Data

The NO₂ diffusion tube data are summarised in Table 2.5. The full dataset (monthly mean values) are included in Appendix A.

Results for year 2014 have been bias adjusted using the national bias adjustment factor. Three months of data were not available in 2014; these were January, February and March. All sites had to be annualised as there were 9 months or fewer data capture. Full details of the annualisation, bias adjustment and QA/QC procedure are provided in Appendix A.

There were 8 sites in 2014 where the annual mean AQS objective was exceeded.

Figures 2.5 through to 2.8 shows the trend in NO₂ concentration for the sites located in Gloucester City Council. The concentrations peaked in 2008 at the majority of sites. Majority of sites also showed an increase in concentrations in 2010 and 2012. Concentrations reduced significantly in 2013 at most sites.

At Priory Road AQMA all the results are still in excess of the Air Quality Objective.

There were three locations where Air Quality Objectives were breached in the Barton Street AQMA

The Painswick Road AQMA shows that the Air Quality Objectives have not been exceeded at any of the monitoring although one site was close to a breach.

Barnwood Road is an area of concern and will continue to be monitored.

Other locations measured such as Bristol Road and the motorway area remain of no concern for air quality. Elmbridge School and The Guildhall are maintained as background sites.

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes in 2014

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.91)
							2014 ($\mu\text{g}/\text{m}^3$)
1	Guildhall	UB	N	N	9		18.68
2	Elmbridge School	UB	N	N	6		17.46
3	79 Millbrook Street	R	N	N	8		31.3
4	59 Bristol Road façade	UB	N	N	9		27.61
5	157 Bristol Road	R	N	N	9		26.9
6	35 Buscombe Gardens	R	N	N	9		27.87
7	12 Caravan site	UB	N	N	9		22.59
Priory Road AQMA							
8	46 Priory Road	R	Y	N	2		60.51
9	56 Priory Road	R	Y	Triplicate	5		70.68
9	56 Priory Road	R	Y	N	5		73.37
9	56 Priory Road	R	Y	N	4		72.5
10	66 Priory Road	R	Y	N	4		58.5
Barton Street AQMA4							
11	99 Barton Street	R	Y	N	5		23.58
12	124 Barton Street	R	Y	N	9		49.7
13	196 Barton St lamp post	R	Y	N	8		42.78
14	219a Barton Street	R	Y	N	9		43.58
15	240 Barton Street	R	Y	N	9		35.51
16	Opp. 250 Barton St	R	Y	N	8		33.19

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.91)
							2014 ($\mu\text{g}/\text{m}^3$)
17	316 Barton St	R	Y	N	7		25.42
18	301 Barton Street	R	Y	N	9		24.86
Painswick Road AQMA Area							
19	65 Painswick Road	R	N	N	7		28.73
20	76 Painswick Road	R	N	N	8		36.04
21	88 Painswick Road	R	Y	N	9		35.78
22	97 Painswick Road	R	Y	N	9		32.38
23	106 Painswick Road	R	Y	N	8		39.03
Barnwood Road							
24	53 Barnwood Road	R	N	N	8		37.9
25	61 Barnwood Road	R	N	N	9		39.37

All results were annualised in accordance with the methodology laid out in TG(09) Box 3.2.

In **bold**, exceedence of the NO2 annual mean AQS objective of 40 $\mu\text{g}/\text{m}^3$

Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2014)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
			2010* (Bias Adjustment Factor = 0.77)	2011* (Bias Adjustment Factor = 0.85)	2012* (Bias Adjustment Factor = 1.01)	2013* (Bias Adjustment Factor = 0.95)	2014 (Bias Adjustment Factor = 0.91)
1	UB	N	22.2	20.1	24.5	23.8 ^a	18.68
2	UB	N	19.9	21.7	22.3	22.2 ^a	17.46
3	R	N	32.4	29.2	31.7	36.6 ^a	31.3
4	R	N	30.0	28.6	30.9	38.0 ^a	27.61
5	R	N	27.9	25.7	27.2	30.5	26.9
6	R	N	29.9	29.0	29.3	34.2	27.87
7	UB	N	26.0	22.6	25.7	26.9	22.59
8	R	N	43.2	43.0	45.9	37.2 ^a	60.51
9	R	Y (Priory Road AQMA)	48.6	45.4	47.4	36.5	70.68
10	R	Y (Priory Road AQMA)	55.8	49.1	52.5	38.4 ^a	58.5
11	R	Y (Barton Street AQMA)	48.2	37.2	40.8	36.2	23.58
12	R	Y (Barton Street AQMA)	40.7	46.2	48	38.8	49.7
13	R	Y (Barton Street AQMA)	43.3	39.9	43.1	35.9	42.78

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
			2010* (Bias Adjustment Factor = 0.77)	2011* (Bias Adjustment Factor = 0.85)	2012* (Bias Adjustment Factor = 1.01)	2013* (Bias Adjustment Factor = 0.95)	2014 (Bias Adjustment Factor = 0.91)
1	UB	N	22.2	20.1	24.5	23.8 ^a	18.68
14	R	Y (Barton Street AQMA)	43.3	35.2	40.8	38.0	43.58
15	R	Y (Barton Street AQMA)	37.2	32.1	36	33.2	35.51
16	R	Y (Barton Street AQMA)	33.9	27.6	33.2	32.7 ^a	33.19
17	R	Y (Barton Street AQMA)	40.1	36.6	39.9	35.4	25.42
18	R	Y (Barton Street AQMA)	27.1	24.1	28.7	22.6	24.86
19	R	N	31.5	26.8	29	27.4	28.73
20	R	N	33.7	32.4	32.9	30.2	36.04
21	R	Y (Painswick Road AQMA)	37.6	36.9	36.7	33.6	35.78
22	R	Y (Painswick Road AQMA)	32.2	29.6	30.3	29.3	32.38

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
			2010* (Bias Adjustment Factor = 0.77)	2011* (Bias Adjustment Factor = 0.85)	2012* (Bias Adjustment Factor = 1.01)	2013* (Bias Adjustment Factor = 0.95)	2014 (Bias Adjustment Factor = 0.91)
1	UB	N	22.2	20.1	24.5	23.8 ^a	18.68
23	R	Y (Painswick Road AQMA)	41	40.9	40.1	38.0	39.03
24	R	N	39.1	37.3	32.4	39.1 ^a	37.9
25	R	N	43.0	38.2	37.8	35.0 ^a	39.37

*Optional

Figure 2.5 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites

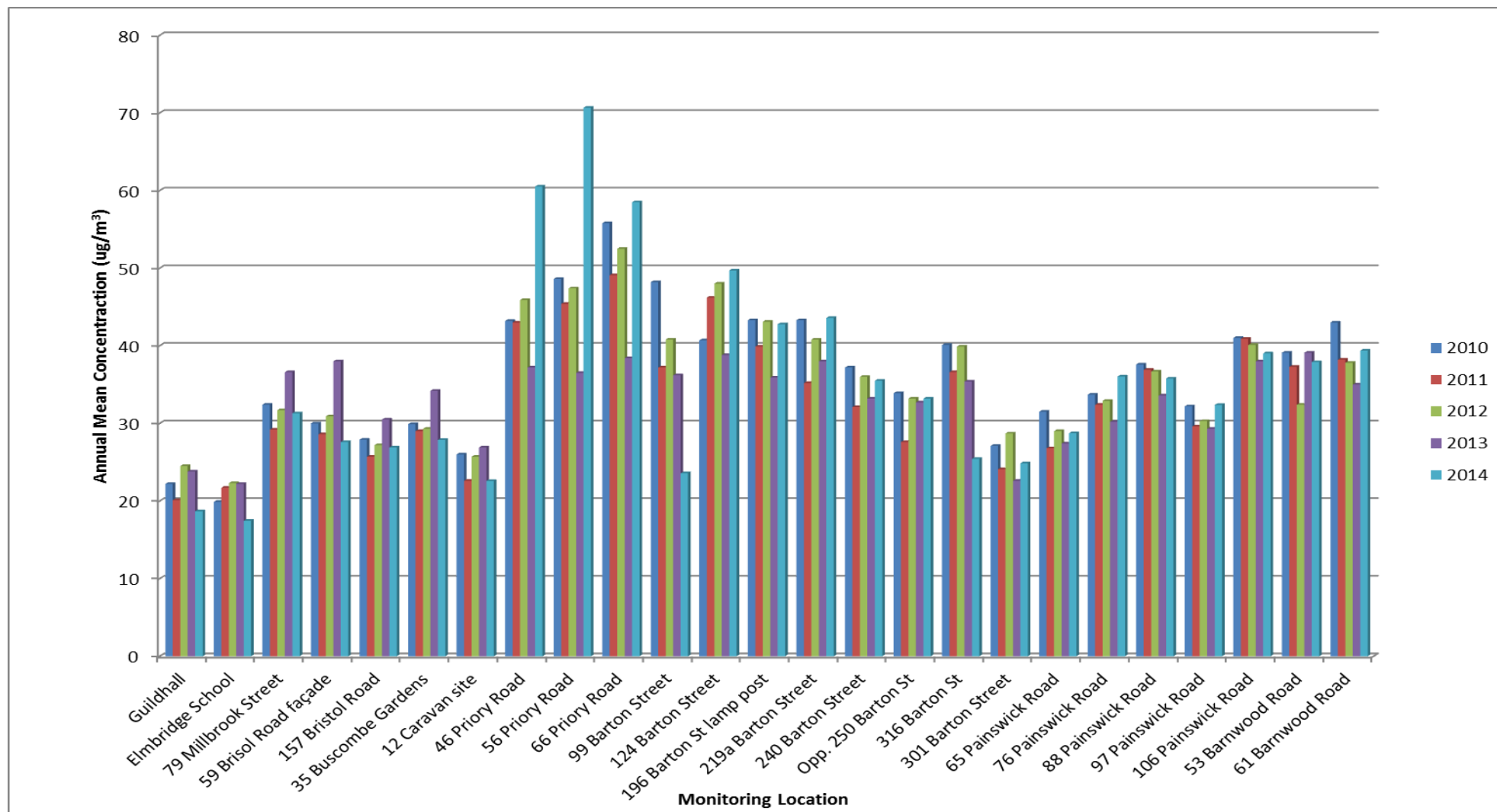


Figure 2.6 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring in Barton Street AQMA

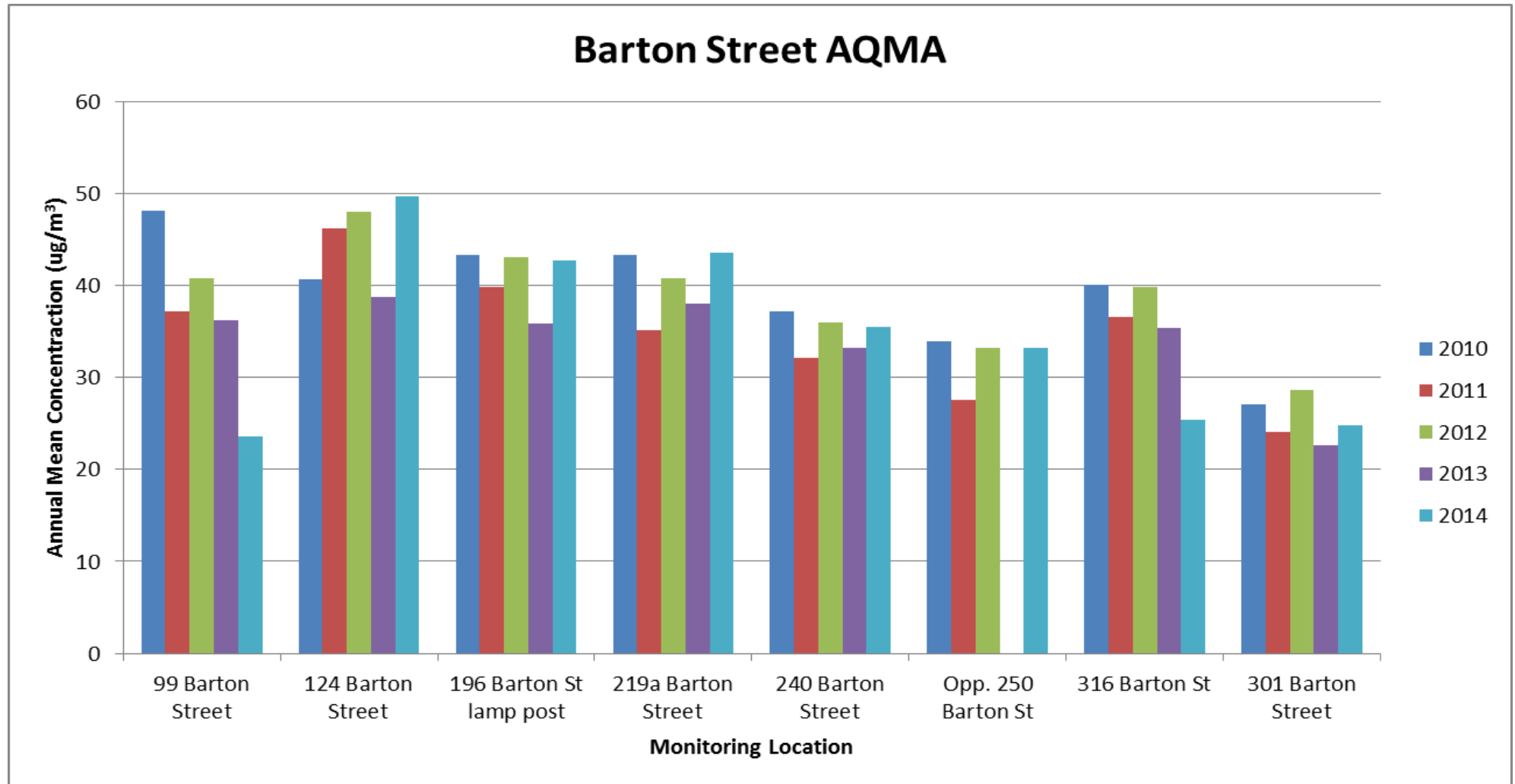


Figure 2.7 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring in Priory Road AQMA

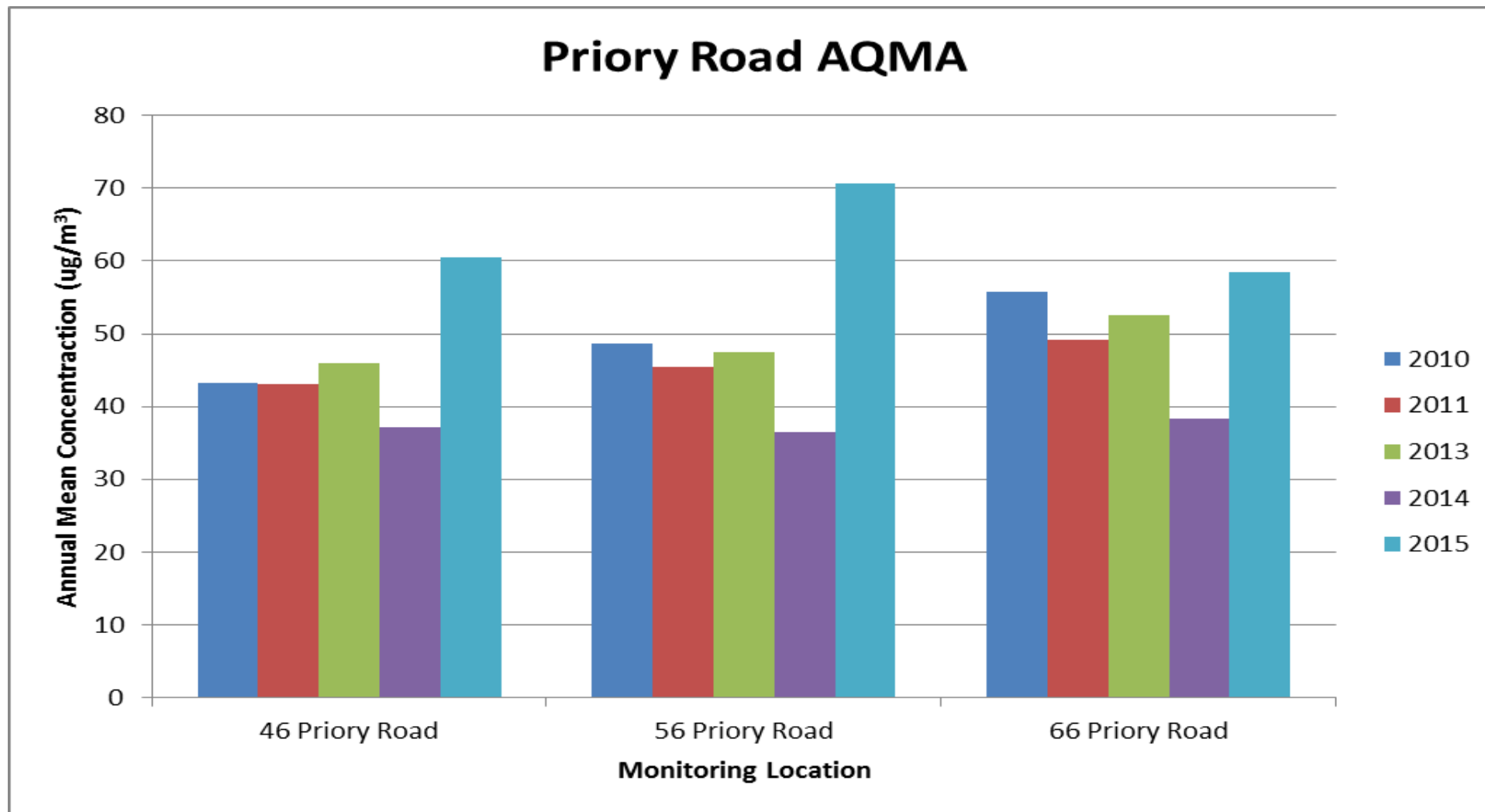
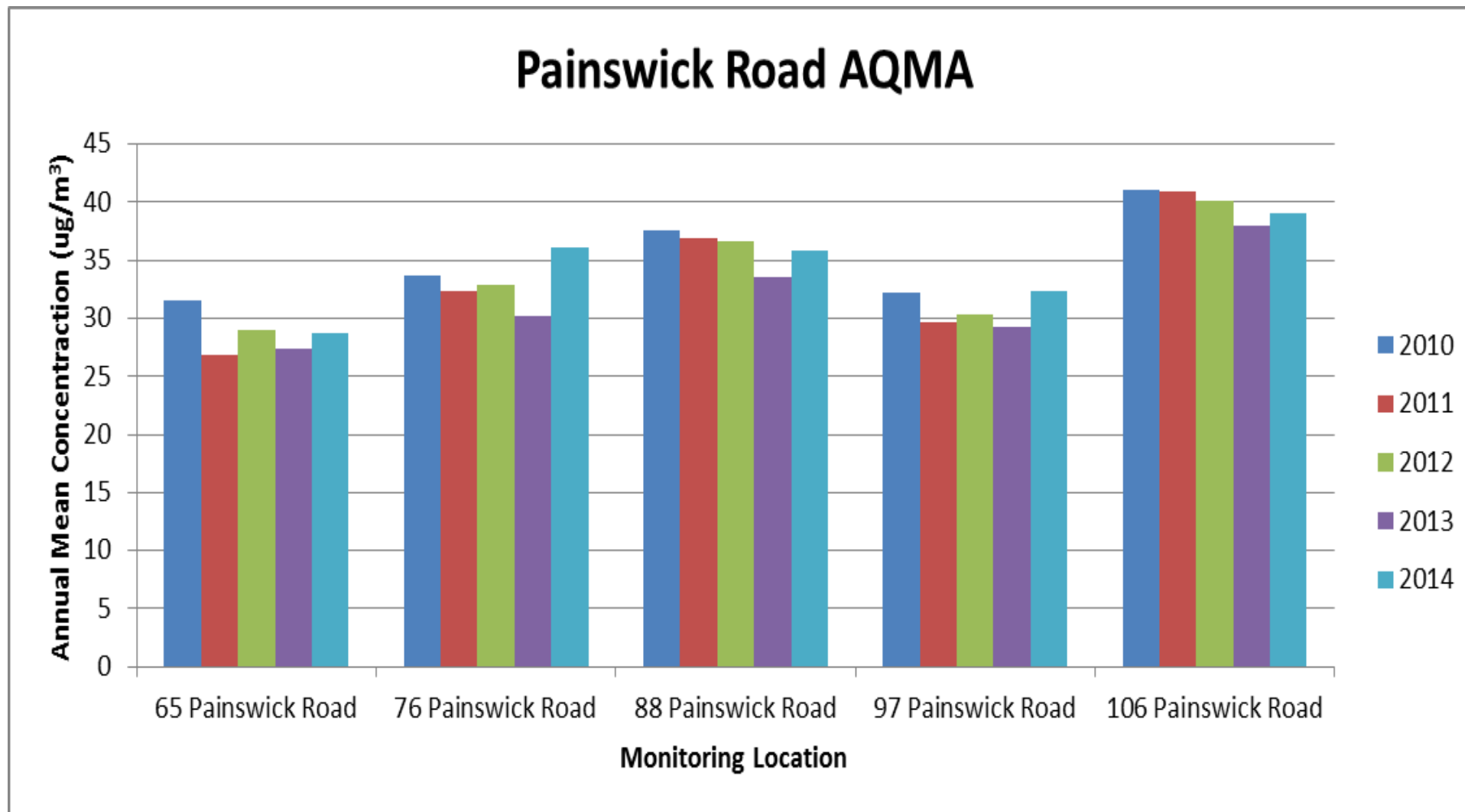


Figure 2.8 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring in Painswick road



1.6.2 PM₁₀

No PM₁₀ monitoring was undertaken by Gloucester City Council in 2014

1.6.3 Sulphur Dioxide

No monitoring of sulphur dioxide was undertaken by Gloucester City Council in 2014

1.6.4 Benzene

No monitoring of benzene was undertaken by Gloucester City Council in 2014

1.6.5 Other pollutants monitored

No monitoring of other pollutants was undertaken by Gloucester City Council in 2014

1.6.6 Summary of Compliance with AQS Objectives

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

2 Road Traffic Sources

2.1 Narrow Congested Streets with Residential Properties Close to the Kerb

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

2.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

Gloucester City Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

2.3 Roads with a High Flow of Buses and/or HGVs.

Gloucester City Council confirms that there are no new/newly identified roads with high flows of buses/HDVs.

2.4 Junctions

Gloucester City Council confirms that there are no new/newly identified busy junctions/busy roads.

2.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

Gloucester City Council confirms that there are no new/proposed roads.

2.6 Roads with Significantly Changed Traffic Flows

Gloucester City Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

2.7 Bus and Coach Stations

Gloucester City Council confirms that there are no relevant bus stations in the Local Authority area.

3 Other Transport Sources

3.1 Airports

Gloucester City Council confirms that there are no airports in the Local Authority area.

3.2 Railways (Diesel and Steam Trains)

3.2.1 Stationary Trains

Gloucester City Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

3.2.2 Moving Trains

Gloucester City Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

3.3 Ports (Shipping)

Gloucester City Council confirms that there are no ports or shipping that meets the specified criteria within the Local Authority area.

4 Industrial Sources

4.1 Industrial Installations

4.1.1 New or Proposed Installations for which an Air Quality Assessment has been carried out

Gloucester City Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

4.1.2 Existing Installations where Emissions have increased substantially or New Relevant Exposure has been introduced

Gloucester City Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

4.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

Gloucester City Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

4.2 Major Fuel (Petrol) Storage Depots

There are no major fuel (petrol) storage depots within the Local Authority area.

4.3 Petrol Stations

Gloucester City Council confirms that there are no petrol stations meeting the specified criteria.

4.4 Poultry Farms

Gloucester City Council confirms that there are no poultry farms meeting the specified criteria.

5 Commercial and Domestic Sources

5.1 Biomass Combustion – Individual Installations

Gloucester City Council confirms that there are no biomass combustion plants in the Local Authority area.

5.2 Biomass Combustion – Combined Impacts

Gloucester City Council confirms that there are no biomass combustion plants in the Local Authority area.

5.3 Domestic Solid-Fuel Burning

Gloucester City Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

6 Fugitive or Uncontrolled Sources

Gloucester City Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

7 Local Transport Plans and Strategies

The Local Transport Plan for Gloucestershire (LTP3) sets out the transport strategy for the County from 2011 to 2026.

The document sets out its vision for transport in the future as: "**Providing a safe and sustainable transport network within Gloucestershire**" where **safe** means a transport network that people feel safe and secure using and **sustainable** means a transport network that is both environmentally and financially sustainable.

Everybody relies on there being a safe and sustainable transport system. Businesses use the transport system to bring their raw materials then deliver their products to the customer. People use the transport system to get to work, shops, schools and colleges, or healthcare facilities. Despite this key role, a working transport system is taken for granted, until problems caused by, for example: flooding, snow, volcanic ash or strike action, disrupt the network.

LTP3 explains how partners can deliver a safe and sustainable transport system in Gloucestershire within the financial limits that are likely to exist over the period covered by LTP3.

Gloucestershire County Council applied to and was successful in obtaining Local Sustainable Transport Fund money from the Department for Transport (DfT) to the sum of almost £5 million pounds. This money will go towards delivering a project that is primarily aimed at supporting economic growth between Gloucester City and Cheltenham and reducing carbon emissions from traffic. A key theme of the project is the promotion of cycling, walking, car sharing and use of public transport along with support for car clubs and electric car charging points.

8 Climate Change Strategies

The Gloucester City Council Climate Change Strategy was published in 2010 and recognises that although climate change is a global issue, tackling it begins closer to home. The Strategy received cross party support with a commitment to manage its estate as a service provider and in a community leadership role to influence the activities within the city that contribute towards climate change.

Our objectives are as followed:

- 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 maximise 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 life; and
- To reduce emissions from the City Council's estate by 10% in the year 2010 and as such sign up to the 2010 campaign.

One of the measures employed to achieve our objectives was the development of a 'Green Travel Plan' to tackle the carbon footprint of an organisation that employs over 350 people and has a large portfolio of assets fuelled by non renewable energy sources.

The Gloucester City Green Travel Plan 2011 – 2015 promotes and identifies ways to encourage a range of sustainable transport modes other than single user private car. The plan aims to assist with reducing congestion, reducing pollution and improving health.

9 Conclusions and Proposed Actions

9.1 Conclusions from New Monitoring Data

The new monitoring data confirms that all three AQMAs are still required. Progress report 2014 identified no exceedences of the AQS objectives however raw 2014 data showed 8 sites which exceeded the AQS objective.

Barnwood Road is now an area of concern with NO₂ levels just under AQS objectives. There was an AQMA in Barnwood until 2010 however the monitoring showed a drop in levels and was revoked. Any changes in traffic or development activity will be closely scrutinised.

9.2 Conclusions from Assessment of Sources

No new potential pollutant sources have been assessed this year.

9.3 Proposed Actions

There is no requirement to proceed to a Detailed Assessment for any pollutant.

Proposed actions arising from the 2015 USA Report are as follows:

- Continue diffusion tube in the City to identify future changes in pollutant concentrations;
- Proceed to the Progress Report 2016.

10 References

- AEA (2008) *Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance for Laboratories and Users*. Report to Defra and the Devolved Administrations.
- Atkins (2012) *Barton Street AQMA Feasibility Report*. Report for Gloucestershire County Council.
- Department for Environment, Food and Rural Affairs (Defra) (2009) *Local Air Quality Management Technical Guidance LAQM.TG(09)*.
- Gloucester City Council (2012) *Updating and Screening Assessment*.
- Gloucester City Council (2013) *Annual Progress Report*.
- Gloucester City Council (2014) *Annual Progress Report*
- Gloucestershire County Council (2011) *Gloucestershire's Local Transport Plan 2011-26*.
- Gloucestershire Pollution Group (2011) *A County-wide Air Quality Strategy for Gloucestershire*.

Appendices

Appendix A: Quality Assurance / Quality Control (QA/QC) Data

Appendix B: Monitoring Data

Appendix A: QA/QC Data

Diffusion Tube Bias Adjustment Factors

The diffusion tubes are supplied and analysed by Gradko utilising the 20% triethanolamine (TEA) in water preparation method. A bias adjustment of 0.91 for the year 2014 (based on 21 studies) has been derived from the national bias adjustment calculator¹.

For previous data, years 2009 to 2013, the bias adjustment factors have been taken from the Council's previous LAQM annual reports. The factors used were; 0.79 (2009), 0.77 (2010), 0.85 (2011), 1.01 (2012) and 0.95 (2013)

Discussion of Choice of Factor to Use

Data have been corrected using a bias adjustment factor, which is an estimate of the difference between diffusion tube concentrations and continuous monitoring, the latter assumed to be a more accurate method of monitoring. The technical guidance LAQM.TG (09) provides guidance with regard to the application of a bias adjustment factor to correct diffusion tubes. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data from NO_x / NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

As no co-location studies have been carried out by Gloucester City Council in 2013 the national bias adjustment factor was used to adjust the diffusion tube data.

The national bias adjustment factor was also used in the previous years

Short-term to Long-term Data Adjustment

Annualisation was made to all diffusion tube monitoring sites due to no monitoring data between January – March and all sites only having 9 months or less of data. The annualised results shown in the table below:

Gloucester City Council

Diffusion Tube ID	Diffusion Tube Name	Bristol St Paul's Annualisation Factor	Cwmbran Annualisation Factor	Harwell Annualisation Factor	Average Annualisation Factor	Bias Unadjusted Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)	Bias Adjusted & Annualised Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)
1	Gloucester Guildhall	1.016	1.094	1.045	1.052	19.51	18.68
2	Elmbridge Junior School	1.050	1.183	1.214	1.15	16.68	17.46
3	79 Millbrook Street	1.031	1.091	1.079	1.067	32.24	31.3
4	57 Bristol Rd (façade)	1.016	1.094	1.045	1.052	28.84	27.61
5	157 Bristol Road	1.016	1.094	1.045	1.052	28.10	26.9
6	35 Buscombe Gardens	1.016	1.094	1.045	1.052	29.11	27.87
7	12 Orchard Park, Green Lane	1.016	1.094	1.045	1.052	23.60	22.59
8	46 Priory Road	1.325	1.529	1.48	1.444	46.05	60.51
9	56 Priory Road	1.214	1.608	1.413	1.413	54.97	70.68
10	56 Priory Road	1.214	1.608	1.413	1.412	57.1	73.37
11	56 Priory Road	1.213	1.516	1.36	1.363	58.45	72.5
12	66 Priory Road	1.118	1.309	1.0733	1.167	55.05	58.5
13	99 Barton Street	0.92	0.876	0.859	0.885	43.67	23.58
14	124 Barton Street	1.016	1.094	1.045	1.052	51.92	49.7
15	196 Barton Street	0.997	1.037	0.993	1.009	46.59	42.78
16	219A Barton St	1.016	1.094	1.045	1.052	45.52	43.58
17	240 Barton Street	1.016	1.094	1.045	1.052	37.09	35.51
18	Opp 250 Barton St	0.997	1.037	0.993	1.009	36.14	33.19
19	316 Barton Street	0.971	0.958	0.934	0.955	43.64	25.42
20	301 Barton St	1.019	1.086	1.069	1.058	25.82	24.86
21	65 Painswick Rd	1.040	1.161	0.974	1.058	29.84	28.73
22	76 Painswick Rd	0.997	1.037	0.993	1.009	39.25	36.04
23	88 Painswick Road	1.016	1.094	1.045	1.052	37.38	35.78
24	97 Painswick Road	1.016	1.094	1.045	1.052	33.82	32.38
25	106 Painswick Road	1.007	1.101	1.006	1.038	41.32	39.03
26	53 Barnwood Road	1.06	1.186	1.016	1.087	38.32	37.9
27	61 Barnwood Road	1.016	1.094	1.045	1.052	41.13	39.37

QA/QC of Diffusion Tube Monitoring

Gradko International Ltd is a UKAS accredited laboratory and participates in the Workplace Analysis Scheme for Proficiency (WASP) for NO₂ diffusion tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO₂ concentrations reported are of a high calibre. The lab follows the procedures set out in the Harmonisation Practical Guidance. In the latest available WASP results, rounds 121 through to 124 (April 2013 – Feb 2015) Gradko International have scored 100%.