2012 Air Quality Updating and Screening Assessment for **Gloucester City Council**

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

May 2012

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Executive Summary

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. A paper is being prepared for the Gloucester Leadership Team and Members which proposes a merger of Barton Street AQMA and Painswick Road AQMA. If agreed to and implemented this will ensure any actions to reduce air quality in one AQMA will not negatively impact on another. This will also invite co-ordinated solutions to the air quality issues in the area.

An Automatic Monitoring Unit will be installed in the Priory Road AQMA to determine the extent of the problem. This is expected to be in place by June 2012. (Can we say this has been done by the time document is finalised)

We will be recommending to Senior Management and Members that the AQMAs in existence in Barton Street and Painswick Road are merged so that any action taken to reduce traffic in one of the AQMAs does not negatively impact on the aims of the other.

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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 city is unusual in having very little rural hinterland.

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. There are several Part A1 industrial processes in the city, mainly due to discharges to sewer, and thus of no concern here. There are 41 installations permitted under Part B, including petrol stations, vehicle refinishers, dry cleaners, timber yards, none of which are significant polluters.

I don't think we have enough here. A brief description of our road network i.e. arterial roads with several main routes into City including Barton Street, Barnwood Road, Metz Way etc etc. In addition it is worth mentioning the railway and airport as well as the docks.

There is an Permitted A(2) Installation in the City. It is a non-ferrous foundry melting aluminium.

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.

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 micrograms per cubic metre $\mu g/m^3$ (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 Local Air Quality Management in England.

Pollutant	Air Quality Objective Concentration	Measured as	To be achieved by
Benzene			
All authorities	16.25 µg m^{-3}	Running annual mean	31-Dec-03
England and Wales Only	5.00 µg m^{-3}	Annual mean	31-Dec-10
1,3-Butadiene	2.25 µg m^{-3}	Running annual mean	31-Dec-03
Carbon Monoxide			
England, Wales and N. Ireland	10.0 mg m^{-3}	Maximum daily running 8-hour mean	31-Dec-03
Lead	0.5 µg m^{-3}	Annual mean	31-Dec-04
	0.25 µg m^{-3}	Annual mean	31-Dec-08
Nitrogen Dioxide	200 µg m^{-3} not to be exceeded more than 18 times a year	1-hour mean	31-Dec-05
	40 µg m^{-3}	Annual mean	31-Dec-05
Sulphur dioxide	350 µg m^{-3}, not to be exceeded more than 24 times a year	1-hour mean	31-Dec-04
	125 µg m^{-3}, not to be exceeded more than 3 times a year	24-hour mean	31-Dec-04
	266 µg m^{-3}, not to be exceeded more than 35 times a year	15-minute mean	31-Dec-05
Particles (PM_{10}) (gravimetric)			
All authorities	50 µg m^{-3}, not to be exceeded more than 35 times a year	Daily mean	31-Dec-04
	40 µg m^{-3}	Annual mean	31-Dec-04
	18 µg m^{-3}	Annual mean	31-Dec-10
Particles ($PM_{2.5}$) (gravimetric) *	25 µg m^{-3} (target)	Annual mean	2020
All authorities	20% cut in urban background exposure	Annual mean	2010 - 2020
PAH *	0.25 ng m^{-3}	Annual mean	31-Dec-10
Ozone *	100 µg m^{-3} not to be exceeded more than 10 times a year	8 hourly running or hourly mean*	31-Dec-05

1.4 Summary of Previous Review and Assessments

Reports from 2003 onwards are available on the City Council website via www.gloucester.gov.uk/pollution ; copies of earlier documents can be made available for our normal copying charge. The outcomes of the various reports are summarised below.

Maps of our current AQMAs are in **Appendix C**

Assessment reports under the act began in 1998, when it was thought that particulates and nitrogen dioxide would need further study

Air Quality in Gloucester: December 1998

Stage II showed that at that time there were no areas of concern for air quality in the city

Air quality Review and Assessment Stages 2 and 3: December 2000

The USA for 2002 showed that detailed assessments were required as follows:

For benzene: Millbrooke Road near the level crossing

For Nitrogen Dioxide: Priory Road; Barton Street; Eastern Avenue/ Painswick Road junction

For PM10: Barnwood Road at Elmbridge road; Eastern Ave/ Painswick Road junction

Updating and Screening Assessment of Local Air Quality for 2002: May 2003

The detailed assessments subsequently found that AQMAs were required for nitrogen dioxide for Priory Road and for Barton Street. These were declared after consultations in 2005.

Detailed Assessment of Local Air Quality for 2003/4: December 2004

Progress Report for 2004: March 2005

The USA for 2005 found that a detailed assessment for nitrogen dioxide was required again for a small part of Painswick Road (the same area as in 2002)

Updating and Screening Assessment for 2005: April 2006

Source apportionment for Priory Road and Barton Street was explored in 2006, without firm conclusions

Source Apportionment for the two AQMAs in Gloucester: December 2006

The progress report for 2006 included a detailed assessment for Painswick Road which confirmed that an AQMA should be declared and that a detailed assessment was required for 53-65 Barnwood Road. The report included progress reports on the Priory Road and Barton Street AQMAs

Gloucester Air Quality Progress Report for 2006: March 2007

The Painswick Road AQMA was declared after consultation (which enlarged the expected area) in 2007

The Progress report for 2007 included the detailed assessment for Barnwood Road. This showed that an AQMA was not required. Unfortunately a further detailed assessment will now be required.

Gloucester Air Quality Progress Report for 2007: March 2008

Draft Air Quality Action Plan for Priory Road, Painswick Road (North)and Barton Street: July 2008
Gloucester Air Quality Update Screening Assessment 2009

Gloucester City Council

The USA determined a need for a detailed assessment of PM_{10} at Myers Road.

Gloucester Detailed Air Quality Assessment of the vicinity of Myers Road 2010

This detailed assessment determined that the levels of PM_{10} met the Air Quality Objective for PM_{10} at this location.

Gloucester Air Quality Progress Report 2010

This report confirmed that Air Quality Management Areas are not required for PM_{10} at Myers Road or Nitrogen Dioxide at Barnwood Road.

Gloucester Air Quality Progress Report 2011

This report included the first year of continuous monitoring data from the Barton Street Air Quality Management Area. The data showed that the continued need for an AQMA at this location.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

An automatic monitoring site was in use during the period of this report. The County Council has installed a nitrogen dioxide chemiluminescence station at the City end of Barton Street adjacent to the inner ring road. The monitor has been operating since 1st April 2010. Since April 2011 the Site has been operated by Gloucester City Council. The monitor is a Teledyne chemiluminescence Nitrogen Oxides Analyser. A summary results of the automatic monitoring are presented in Table 2.2

Figure 2.1 Teledyne chemiluminescence Nitrogen Oxides Analyser in Barton Street

Air Quality Statistics

Pollutant	NO_2	NO_X
Number Very High	0	-
Number High	0	-
Number Moderate	0	-
Number Low	6331	-
Maximum 15-minute mean	287 µg m^{-3}	1142 µg m^{-3}
Maximum hourly mean	145 µg m^{-3}	965 µg m^{-3}
Maximum running 8-hour mean	121 µg m^{-3}	593 µg m^{-3}
Maximum running 24-hour mean	98 µg m^{-3}	421 µg m^{-3}
Maximum daily mean	92 µg m^{-3}	411 µg m^{-3}
Average	46 µg m^{-3}	124 µg m^{-3}
Data capture	72.3 %	72.3 %

All mass units are at 20'C and 1013mb
NO_X mass units are NO_X as NO_2 µg m-3

Table 2.2 A summary of the ratified 2010 data for the Automatic Monitoring site in the Barton Street AQMA. Source: AQDM Ltd.

Air Quality Statistics

Pollutant	NO	NO_2	NO_X
Number Very High #	-	0	-
Number High #	-	0	-
Number Moderate #	-	0	-
Number Low #	-	7129	-
Maximum 15-minute mean	954 µg m^{-3}	348 µg m^{-3}	1805 µg m^{-3}
Maximum hourly mean	608 µg m^{-3}	197 µg m^{-3}	1079 µg m^{-3}
Maximum running 8-hour mean	273 µg m^{-3}	133 µg m^{-3}	543 µg m^{-3}
Maximum running 24-hour mean	235 µg m^{-3}	95 µg m^{-3}	452 µg m^{-3}
Maximum daily mean	190 µg m^{-3}	94 µg m^{-3}	374 µg m^{-3}
Average	48 µg m^{-3}	44 µg m^{-3}	117 µg m^{-3}
Data capture	81.4 %	81.4 %	81.4 %

Daily Air Quality Index (DAQI) as defined by COMEAP 1st January 2012
Mass units for the gases are at 20'C and 1013mb
NO_X mass units are NO_X as NO_2 µg m-3

Table 2.3 A summary of the ratified 2011 data for the Automatic Monitoring site in the Barton Street AQMA. Source: AQDM Ltd.

The data shows that the objective for the annual mean of Nitrogen Dioxide (40µg m^{-3}) has been exceeded in the year January – December 2010 and 2011.

The average figure for the year is 44µg m^{-3}. This confirms that the AQMA should remain in place and actions to reduce the annual mean concentration are required.

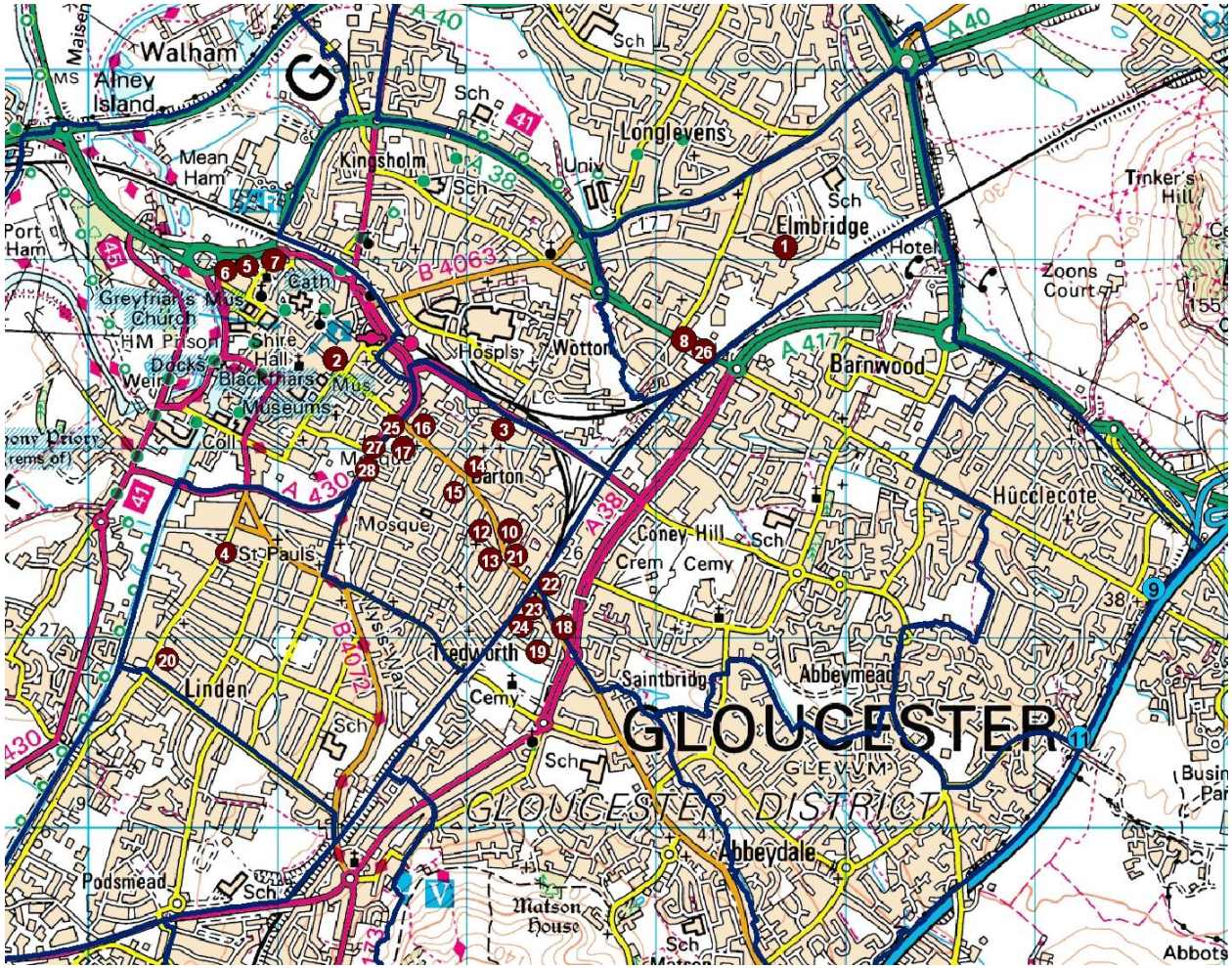


Figure 2.2 Key Map of Non-Automatic Monitoring Sites

2.1.2 Non-Automatic Monitoring

Non-Automatic monitoring has continued for nitrogen dioxide and for benzene. The data is given in Appendix **B**. Information on laboratory QA/QC is given in **Appendix A.** The locations of the sampling points are tabled below. Discussion of results follows at section 2.2

Table 2.4 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	Worst-case Location?
Elmbridge Junior School	1	Urban background	X 385430 Y 218870	Benzene, NO_2	N	Y 1m	NA	N
Guildhall	2	Urban background	X 383243 Y 218489	Benzene, NO_2	N	N	NA	N
79 Millbrook Street	3	Roadside	X 384190 Y 218160	Benzene, NO_2	N	Y <1M	1	Y
59 Bristol Rd (façade)	4	Background	X 382690 Y217440	NO2	N	Y 1m		Y
56 Priory Road	5	Roadside	X 382921 Y 219034	NO_2	Y	Y <1m	5	Y
46 Priory Road	6	Roadside	X 382898 Y 219029	NO_2	Y	Y <1m	5	Y
66 Priory Road	7	Roadside	X 382950 Y 219040	NO_2	Y	Y <1m	6	Y
53 Barnwood Road	8	Roadside	X 385113 Y 218595	NO_2	N	Y <1m	1.5	Y
35 Buscombe Gardens	9	Background	X 387670 Y 217250	NO_2	N	Y <1m	NA	N
Opp 248 Barton St	10	Roadside	X 384090 Y 217731	NO_2	Y	Y <1m	2.5	Y
12 Caravan Green Lane	11	Background	X 387250 Y 216530	NO_2	N	Y <1m	NA	N
246 Barton Street	12	Roadside	X 384081 Y 217725	NO_2	Y	Y <1m	1.5	Y
316 Barton street	13	Roadside	X 384175 Y 217501	NO_2	Y	Y <1m	2.4	Y
219A Barton St	14	Roadside	X 384000 Y 217863	NO_2	Y	Y 1M	1.7	Y
196 Barton Street	15	Roadside	X 383989 Y 217857	NO_2	Y	Y 1m	2	Y

99 Barton Street	16	Roadside	X 383717 Y 218094	NO_2	Y	Y 1m	1.4	Y
124 Barton Street	17	Roadside	X 383726 Y 218074	NO_2	Y	Y 1m	1.5	Y
97 Painswick Road	18	Roadside	X 384558 Y 216946	NO_2	Y	Y 1M	5.1	Y
106 Painswick Road	19	Roadside	X 384550 Y 216932	NO_2	Y	Y 1m	3.5	Y
157 Bristol Rd	20	Roadside	X 382410 Y 217013	NO_2	N	Y 1m	6.5	Y
301 Barton St	21	Roadside	X 384182 Y 217533	NO_2	Y	Y 1m	4.8	Y
65 Painswick Rd	22	Roadside	X 384512 Y 217023	NO_2	N	Y 1m	5.4	Y
76 Painswick	23	Roadside	X 384490 Y 217027	NO_2	N	Y 1m	3.7	Y
88 Painswick Road	24	Roadside	X 384509 Y 216998	NO_2	Y	Y 1m	3.8	Y
Barton Street	25	Background	X 383717 Y 218094	NO_2	Y	Y 1m	2	N
Barton Street	27	Roadside	X 383717 Y 218094	NO2	N	N	2	Y
Barton Street	28	Roadside	X 383717 Y 218094	NO2	Y	N	2	Y
61 Barnwood Road	26	Roadside	X 385130 Y218585	NO_2	N	Y 1m	4.6	Y

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

A summary of the corrected results is given in Table 2.5, with results of concern in **Red Bold** **.** The raw data is at Appendix B. Sites 1 and 2 represent urban background. All other sites except the lamppost on Bristol Road (site 4) are representative of public exposure, mostly being on the facades of housing. The lamppost is immediately in front of the façade measurement at site no.5, and is maintained to show the public the drop off of nitrogen dioxide concentration with distance from the kerb.

These results confirm that all three existing AQMAs are still required.

For the **Priory Road AQMA** the results are still in excess of the Air Quality Objective. An Automatic Monitor has been sourced and is due to be located in this AQMA imminently.

For **Barton Street AQMA**, as before some samples outside the narrow canyon on the western side are acceptable. The Automatic Monitor shows that the Air Quality in the canyon still exceeds the Air

Quality Objective. However, the annual average of NO2 has fallen from 46$_{\mu g}$ m^{-3} in 2010 to 44$_{\mu g}$ m^{-3} in 2011.

The **Painswick Road AQMA** shows that the Air Quality Objectives are being breached at just one location. The AQMA will remain in place. The 2011 Action Plan will continue to be followed until the Objectives are met.

The other areas still 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.

Diffusion Tube Monitoring Data

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture 2011 %	Annual mean concentrations 20011 (μg/m^3) Adjusted for bias
1	Guildhall	N	83	20.1
2	Elmbridge School	N	58	21.7
3	79 Millbrook Street	N	92	29.2
5	59 Brisol Road façade	N	83	28.6
6	157 Bristol Road	N	100	25.7
8	35 Buscombe Gardens	N	100	29.0
9	12 Caravan site	N	100	22.6
Priory Road AQMA				
11	**46 Priory Road**	**Y**	**92**	**43.0**
12	**56 Priory Road**	**Y**	**100**	**45.4**
13	**66 Priory Road**	**Y**	**100**	**49.1**
Barton Street AQMA				
15	**99 Barton Street**	**Y**	**100**	37.2
16	**124 Barton Street**	**Y**	**100**	**46.2**
17	**196 Barton St lamp post**	**Y**	**100**	39.9
18	**219a Barton Street**	**Y**	**100**	35.2
20	**246 Barton Street**	**Y**	**100**	32.1
21	Opp. 248 Barton St	**Y**	100	27.6
22	**316 Barton St**	**Y**	**100**	36.6
23	301 Barton Street	**Y**	100	24.1
Painswick Road AQMA Area				
24	65 Painswick Road	**N**	100	26.8
25	76 Painswick Road	**N**	100	32.4
26	**88 Painswick Road**	**Y**	**100**	36.9
27	97 Painswick Road	**Y**	100	29.6
28	**106 Painswick Road**	**Y**	**100**	**40.9**
Barnwood Road				
29	53 Barnwood Road	**N**	67	37.3
30	**61 Barnwood Road**	**N**	**100**	38.2

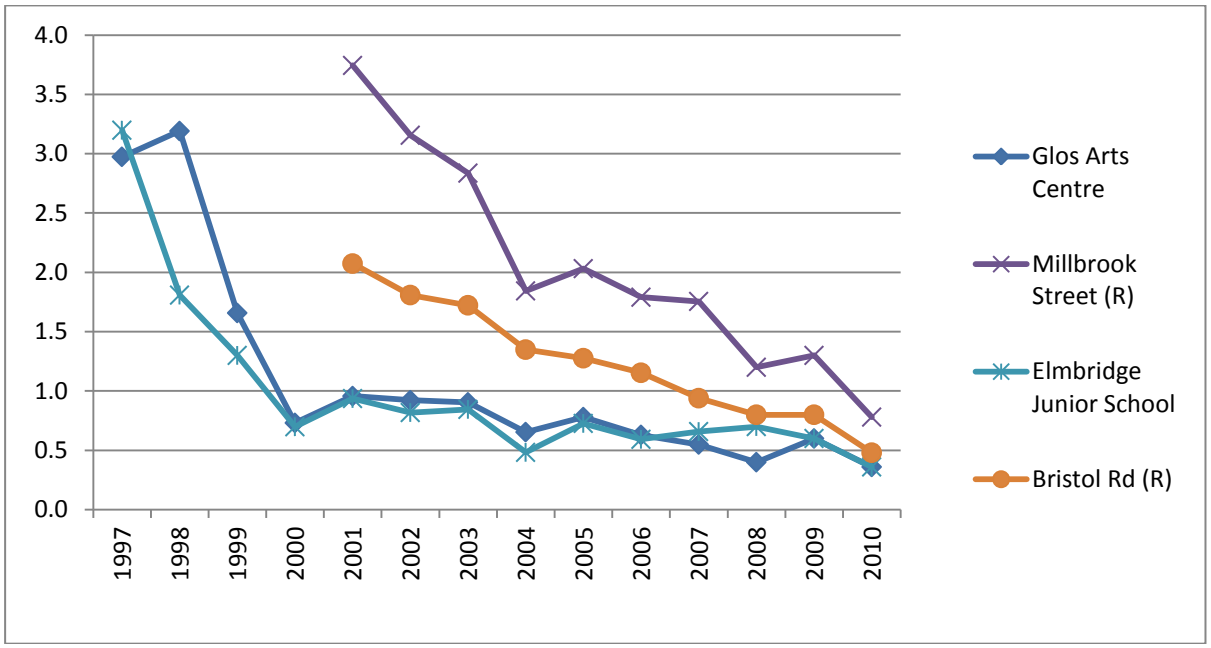
There has been an improvement in data capture because tubes have been repositioned and this has improved tube security while still meeting the needs of accurate measurements.

2.2.2 Benzene

Monthly data for benzene is given in Appendix B. Concentrations had been decreasing below the level of concern. Benzene monitoring ceased in December 2010 because of the consistent downward trend since monitoring begun, to significantly below the objective of 5.00 µg/m3.

A trend graph is shown in Figure 2.5.

Figure 2.6. Annual Benzene concentrations (µg/m3) at locations across Gloucester 1997 - 2010



Gloucester City Council has examined the results from monitoring in the city. Concentrations are all below the objectives, therefore there is no need to continue with monitoring. In the event of a change in circumstances monitoring would recommence.

We do not intend to comment on Benzene after this report unless there is a significant change in circumstances.

3 Road Traffic Sources

3.1 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.

3.2 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.

3.3 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.

3.4 Junctions

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

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

Gloucester City Council confirms that there are no new/proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG(09).

3.6 Roads with Significantly Changed Traffic Flows

Gloucester City Council confirms that there are no new/newly identified roads with significantly changed traffic flows that meet the criteria in section A.6 of Box 5.3 of TG(09).

3.7 Bus and Coach Stations

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

4 Other Transport Sources

4.1 Airports

Gloucester Airport is far enough outside the city and below the criteria given that it does not need consideration. More explanation, distance, type of aircraft, low number of trips etc

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

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

Trains are occasionally stationary for more than 15 minutes at the station and on approaches in all directions, but there are no relevant receptors near enough to need further study.

Elderly diesel locomotives are also sometimes parked adjacent to the offices and warehouses on Great Western Way. These trains are owned by an independent train leasing company. They do give rise to occasional smoke nuisance, but the occasions are not regular enough to warrant study for sulphur dioxide. These are decreasing

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.

4.2.2 Moving Trains

All lines in the City except that out towards Wales have more than 100 movements per day. Since the draft guidance was written, it has been relaxed as a result of further advice, and it seems likely that a much greater number of movements are needed to cause concern. Only certain heavily trafficked lines across the country, none near here(slangy), will now be considered. Monitoring at the various city rail under bridges during 2002 reported in the Updating and Screening assessment for that year showed that railway movements did not measurably increase nitrogen dioxide.

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

4.3 Ports (Shipping) **Cumulative effect of narrow boats burning wood???**

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

5 Industrial Sources

5.1 Industrial Installations

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

A planning application has been submitted by Gloucester City Council to locate a waste incinerator in the adjacent Stroud District Council. It is in the process of being considered and Air Quality is one of the factors that will be reported on and considered as part of the process.

5.1.2 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.

5.1.3 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.

5.2 Major Fuel (Petrol) Storage Depots

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

5.3 Petrol Stations

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

5.4 Poultry Farms

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

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Barclays Bank Bio-Mass boiler. An Application for a Data Centre Combustion Facility was received by the Environment Agency (Ref: EA/EPR/CP3635KA/A001) for an Installation 'Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts.' The application was accompanied by an Air Quality Assessment. The Assessment indicated negligible impacts on ambient Nitrogen Dioxide. The application included occasional breaches of Air Quality targets and the Environment Agency rejected these breaches. How When What was outcome?? Wasn't this replacement fuel (oil) issue if so let's say so.

6.2 Domestic Solid-Fuel Burning

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

7 Fugitive or Uncontrolled Sources

The 2009 guidance proposes that detailed assessments for fine particles are required where there is relevant exposure with 200m of sources of fugitive dust, such as dusty industry or haul roads which are unpaved or have noticeable dust deposits on them. From background mapping, the 2004 concentration of PM_{10} at a potential site off Myers Road was 19.9 ug/m3,limiting the potentially affected area to 200m.

In practice a worst-case location should be examined, as PM_{10} monitoring is costly and requires long sampling times.

Another potential site off Bristol Road with the same PM_{10} background does not have housing within 200m and can thus be disregarded.

Gloucester City Council carried out specific monitoring for PM_{10} at Myers Road and determined that there was no requirement to declare an AQMA at this location for PM_{10}.Can we include reference/link to report

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The new monitoring data shows that the three AQMAs are still required, but merging the Painswick Road AQMA and Barton Street AQMA would add value to the Action Plan by taking the whole of the B4703 into account. The two AQMAs are at opposing ends is the B4703 and there is a significant amount of through traffic. Therefore, it is most sensible to consider options for transport reduction as the whole road rather than two AQMAs.

No concerns are raised in the other areas monitored.

Background Nitrogen Dioxide levels are falling (Source: DEFRA) and it is anticipated that this may be contributing to the fall in NO_2 across Gloucester.

There was an AQMA in Barnwood until 2010 but the monitoring showed a drop in levels and there was no evidence that this would become a problem again. However, it is a watching brief and any changes in traffic or development activity will be closely scrutinised.

8.2 Conclusions from Assessment of Sources

No new potential pollution sources have been assessed this year

8.3 Proposed Actions

It is proposed that the Barton Street AQMA and Painswick Road AQMA be merged. This is to ensure any actions taken to reduce Nitrogen Dioxide in one location does not negatively impact another location

It is hoped that data from the new automatic monitoring station in Priory Road will be on-line by June 2012. This will confirm the levels of Nitrogen Dioxide at the location and provide some real-time analysis. Lets update if we can

Work is ongoing with the County Council to collect more detailed traffic data in and around the AQMAs and Barnwood Road, which will help decide future courses of action to mitigate the problems. LST funding opportunities

A student placement has been offered to Birmingham University for a Public Health student to determine the priority people living in an AQMA give to air quality compared to those not living in an AQMA. The results of this study will form part of the consideration when developing the revised Action Plan.

NO_2 Non-Automatic Monitoring has been moved to Gradko following the demise of Bristol Scientific Services. It is intended to co-locate a triple NO2 tube at the Priory Road site adjacent to the Automatic Monitor.

Gloucestershire Air Group (GAG) is now a year old and is a source of information sharing as well as looking to attract resource. There is some funding from the Local Sustainable Transport Fund (LSTF) and it is hoped that some funding will be available to improve the situation of the existing AQMAs in Gloucester.

9 References

All documents produced by the City Council are referenced in section 1.4 and can be seen via www.gloucester.gov.uk/pollution

DEFRA Guidance documents are available at http://www.defra.gov.uk/environment/airquality/local/index.htm The main document referred is TG 09

QA data was provided by Bristol Scientific Services (Private communication)

The Bias Adjustment spreadsheet is available at http://www.uwe.ac.uk/aqm/review/index.html

Do we need to reference AQDM Ltd

Appendices

Appendix A: QA/QC Data

Appendix B: Monitoring Data

Appendix C: Maps of AQMAs

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Tubes were supplied and analysed by Bristol Scientific Services using 50 ul 20%TEA. The tubes were prepared according to the practical guidance manual published by AEA for DEFRA. The bias adjustment factor for 2011 was 0.87 from helpdesk spreadsheet v03/09

Factor from Local Co-location Studies (if available)

No co-location studies were available

Short-term to Long-term Data adjustment

No adjustments were made as there were few gaps in the record. These (what are these?)were due to loss of tube to vandalism, spiders in tube or collapse of holder.

QA/QC of diffusion tube monitoring

WASP results for Bristol Scientific Services are quoted here.

WASP Results Lab 152 Round 97 onwards:

Round	97	98	99	100	101	102	103	104
Tube 1 (µg NO_2)	0.890	1.865	2.085	1.358	0.949	1.489	1.178	1.179
Tube 2 (µg NO_2)	1.573	1.228	2.093	1.474	2.576	1.431	0.916	1.108
Tube 3 (µg NO_2)	1.582	1.857	0.885	1.354	1.813	2.307	0.934	1.840
Tube 4 (µg NO_2)	0.914	1.217	0.879	1.467	0.914	1.960	1.071	1.960
Spike tube 1 (µg NO2)	0.890	1.830	2.150	1.360	0.920	1.370	1.220	1.220
Spike tube 2 (µg NO2)	1.580	1.190	2.150	1.470	1.860	1.370	0.940	1.220
Spike tube 3 (µg NO2)	1.580	1.830	0.840	1.360	1.860	2.280	0.940	2.020
Spike tube 4 (µg NO2)	0.890	1.190	0.840	1.470	0.920	2.280	1.220	2.020
Standardised result tube 1	1.000	1.019	0.970	0.999	1.032	1.087	0.966	0.966
Standardised result tube 2	0.996	1.032	0.973	1.003	1.385	1.045	0.974	0.908
Standardised result tube 3	1.001	1.015	1.054	0.996	0.975	1.012	0.994	0.911
Standardised result tube 4	1.027	1.023	1.046	0.998	0.993	0.860	0.878	0.970
Performance index	1.87	5.29	16.61	0.08	374.65	73.42	41.98	45.95
Rolling performance index (NOT best of 4 out of 5)				5.96	99.16	116.19	122.53	134.00
Rolling performance index (best 4 out of 5)				5.96	5.96	23.85	33.02	40.36
Performance classification (criteria from April 2009) Good =<56.25 Acceptable =<225 Unacceptable >225				Good	Good	Good	Good	Good

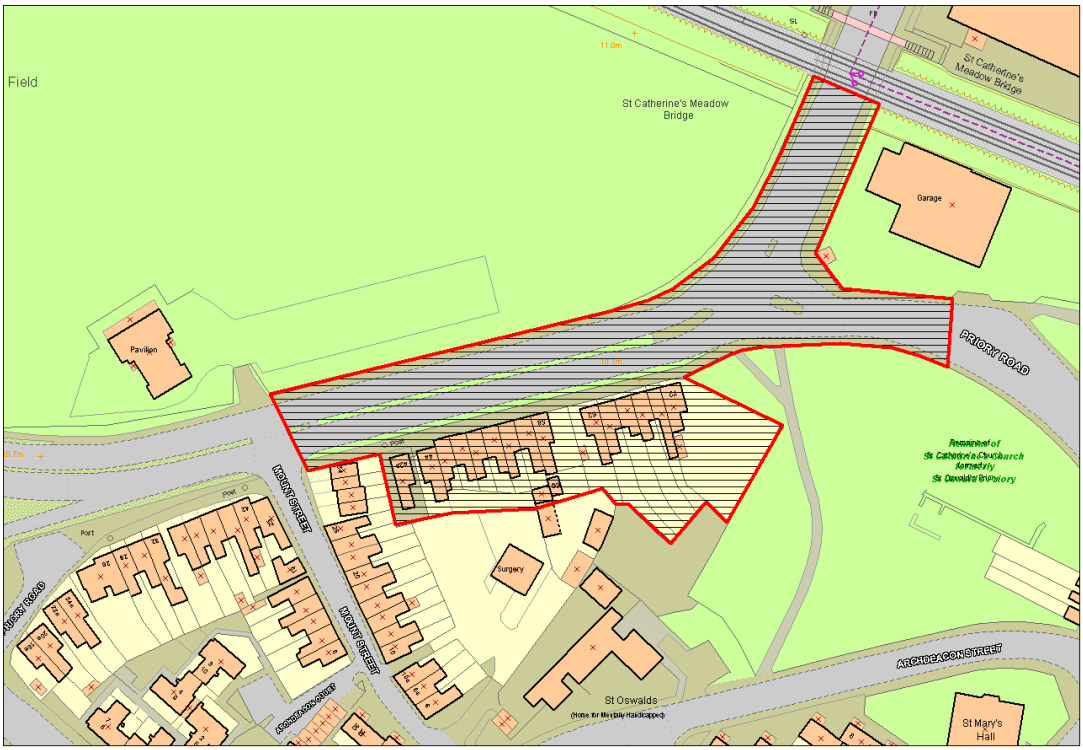
Appendix B: Diffusion tube data

Location	Within AQMA?	Data Capture for monitoring period[a] %	Data Capture for full calendar year 2010 %	Annual mean concentrations (μg/m^3)		
				2009 [c]	2010	2011
Elmbridge JS	N	92	100	19.1	19.9	21.7
Guildhall	N	92	100	21.5	22.2	20.1
79 Millbrook St	N	100	100	35	32.4	29.2
59 Bristol Rd	N	100	100	31.5	30	28.6
56 Priory Road	Y	100	100	**55**	**48.6**	**45.4**
46 Priory Rd	Y	100	100	**47.7**	**43.2**	**43.0**
66 Priory Road	Y	100	100	**56**	**55.8**	**49.1**
53 Barnwood rd	N	92	92	**40.6**	39.1	37.3
35 Buscombe Gdns	N	100	100	31.4	29.9	29.0
Opp. 248 Barton	Y	100	100	32.6	33.9	27.6
Orchard Park	N	100	100	26.1	26	22.6
246 Barton St	Y	100	100	**40.8**	37.2	32.1
316 Barton St	Y	100	100	**40.9**	**40.1**	36.6
219A Barton St	Y	100	100	37.4	**43.3**	35.2
196 Barton St	Y	100	100	37.5	**40.7**	39.9
99 Barton St	Y	100	100	39.1	**41.3**	37.2
124 Barton St	Y	100	100	**51.6**	**48.2**	**46.2**
97 Painswick rd	Y	92	92	34.8	32.2	29.6
106 Painswick Rd	Y	100	100	**43.7**	**41**	**40.9**
157 Bristol road	N	100	100	29.5	27.9	25.7
301 Barton st	Y	100	100	29.7	27.1	24.1
65 Painswick rd	N	100	100	30.8	31.5	26.8
76 Painwick rd	N	100	100	37.2	33.7	32.4
88 Painswick rd	Y	100	100	39.8	37.6	36.9
Barton Street (Triple)	Y	N/A	N/A	N/A	N/A	N/A
61 Barnwood Rd	N	92	92	**42.5**	**43**	38.2
Barton Street (Triple)	Y	N/A	N/A	N/A	N/A	N/A
Barton Street (Triple)	Y	N/A	N/A	N/A	N/A	N/A

	2011 Nitrogen Dioxide raw monthly data												
All values microgrammes per cubic metre													
	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Average
Location													
Sites previously in national monitoring programme													
Glos Guildhall	37.7	31.2	35.8	27.2	15.1	16.0	19.2			24.1	32.8	21.8	26.1
Elmbridge Junior School	35.3	30.6	32.3	22.5						21.7	31.3	24.0	28.2
79 Millbrook Street	58.0	41.1	40.1	45.0	29.9	29.5	37.4	27.7	29.2		41.8	37.8	38.0
Bristol Road sites													
59 Bristol Road facade	54.1	41.6	47.9	37.0	27.0	26.6	31.4	26.7	30.2	34.9	43.7	33.2	36.2
157 Bristol Road	39.5	41.4	42.0	35.7	23.9	24.8	29.1	20.2	30.3	35.6	40.6	27.8	32.6
Sites near M5 Motorway													
35 Buscombe Gardens	49.8	44.4	48.7	42.9	30.6	28.3	35.4	27.4	30.3	38.4	45.1	30.8	37.7
12 Orchard Park Green Lane	42.1	37.0	39.9	31.3	22.0	22.2	24.7	20.6	21.8	27.9	37.3	24.8	29.3
Priory Road AQMA Area													
46 Priory Road	68.8	74.2	49.6	68.6	45.2	41.8	55.9	54.4	36.5	50.8	67.6		55.8
56 Priory Road	75.0	80.3	62.1	49.5	54.3	44.7	57.3	59.7	44.5	60.6	64.3	55.7	59.0
66 Priory Road	80.0	89.5	61.6	75.5	55.7	48.8	69.6	56.4	47.9	68.1	69.4	43.0	63.8
Barton Street AQMA Area													
99 Barton St (Enterprize cntr)	63.5	51.4	55.0	59.0	37.3	36.0	51.4	41.8	40.7	47.0	55.5	41.4	48.3
124 Barton St (Icon.net)	70.4	59.7	64.8	66.9	48.2	50.6	63.4	53.8	54.0	62.8	61.1	64.3	60.0
196 Barton Street lamppost	57.9	54.6	52.2	54.9	43.9	44.5	55.1	46.1	47.9	56.8	56.4	52.1	51.9
219A Barton St post	60.7	46.6	59.2	56.9	38.1	33.8	51.1	37.1	35.1	42.5	49.8	37.1	45.7
246 Barton Street	48.7	46.0	54.2	51.3	35.1	30.4	41.0	34.8	34.7	44.9	45.6	39.3	42.2
opp. 248 Barton Street	53.9	39.1	52.2	35.1	25.9	24.9	34.4	28.3	28.8	35.8	40.7	31.4	35.9
316 Barton Street	55.2	49.7	53.2	50.0	36.3	39.4	46.7	41.2	42.3	53.9	54.1	47.9	47.5
301 Barton street	46.2	35.1	46.8	38.4	21.0	21.1	27.8	22.6	25.0	29.7	36.9	25.2	31.3
Painswick Road AQMA Area													
65 Painswick Road	42.1	44.7	50.3	43.4	19.3	25.5	34.0	25.9	26.7	35.7	42.9	26.6	34.7
76 Painswick Road	56.2	45.2	49.7	48.0	29.9	33.8	39.2	33.5	36.1	43.4	47.2	42.1	42.0
88 Painswick Road	58.2	64.6	54.1	53.3	38.9	38.6	44.7	39.9	42.8	48.5	49.2	42.5	47.9
97 Painswick Road	52.7	43.2	49.8	41.0	29.9	31.3	37.1	30.8	30.3	39.1	42.7	34.0	38.5
106 Painswick Road	68.2	55.9	57.8	58.9	46.4	47.6	51.6	44.1	47.7	57.0	55.4	46.4	53.1
Barnwood Road													
53 Barnwood Road	63.0	54.1	59.1	52.3	41.0	38.8	44.2	35.2					48.5
61 Barnwood Road	69.0	54.8	69.2	60.7	36.9	37.9	47.7	36.6	41.2	46.4	54.8	39.7	49.6

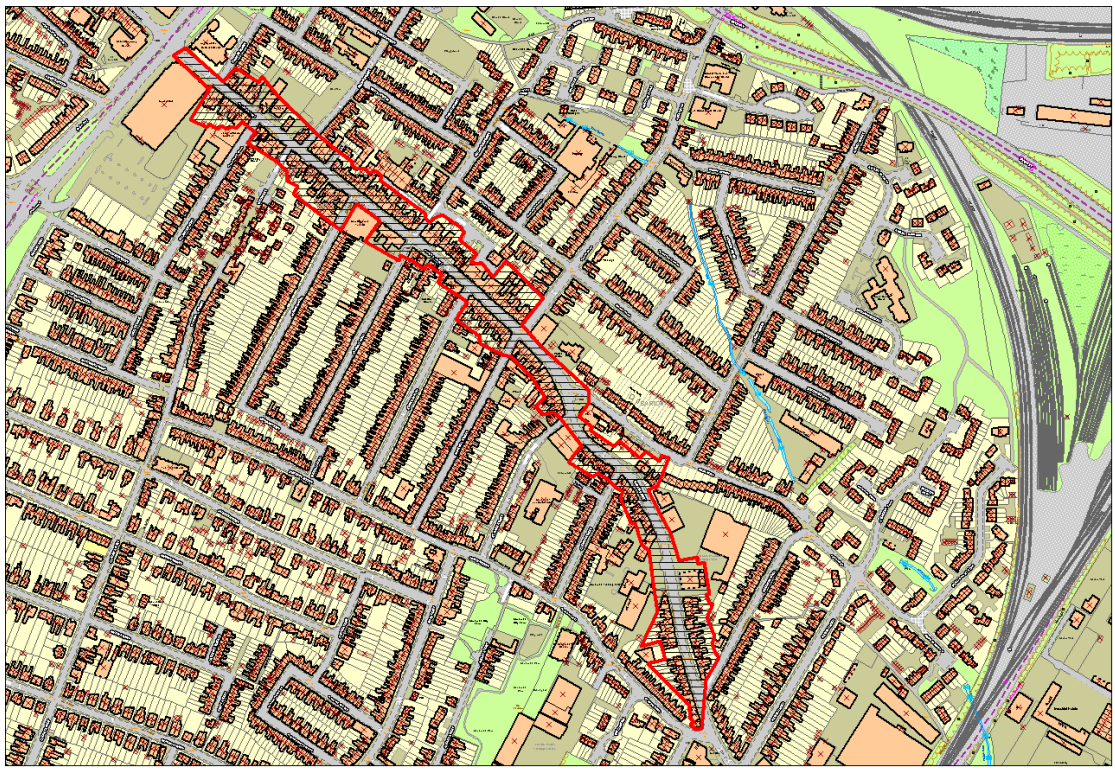
Appendix C:
Maps of Air Quality Management Areas in Gloucester City

Priory Road AQMA including affected domestic properties

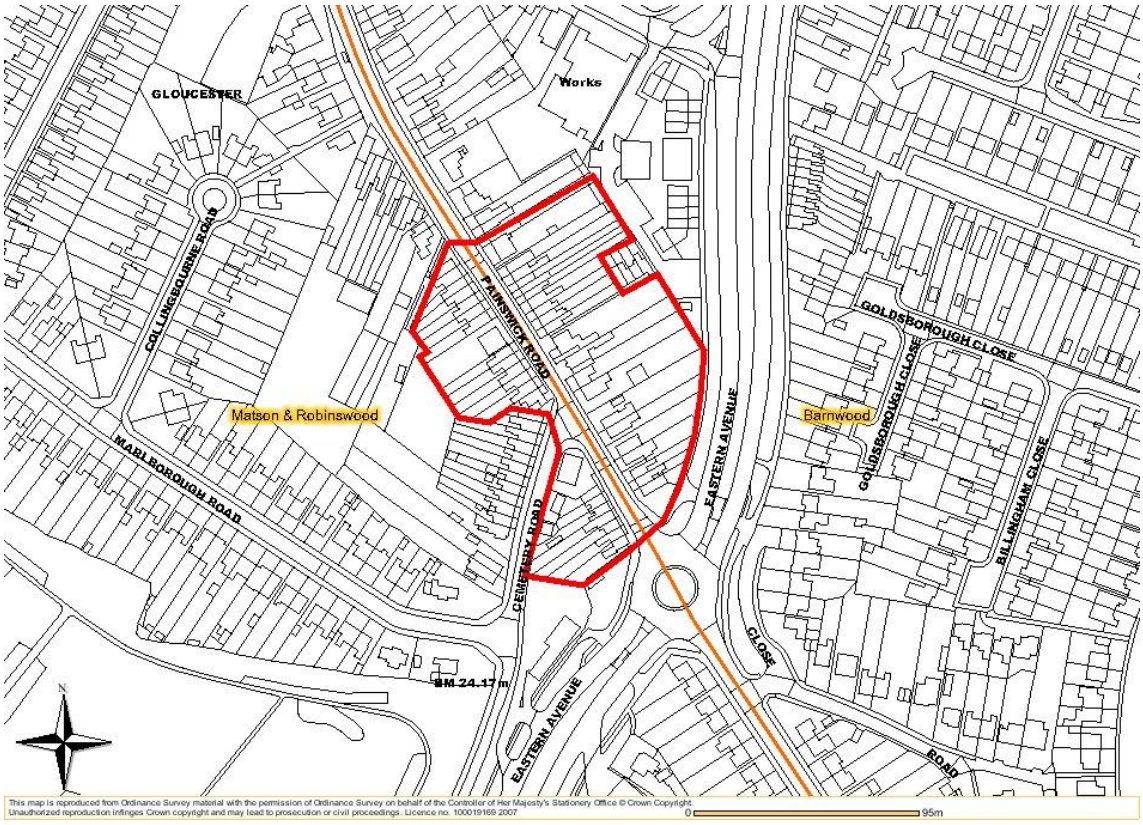


Map 2 Barton Street AQMA including affected domestic properties

Future domestic properties fronting the Street are also included in the order



Painswick Road Air Quality Management Area



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